Fountain Technical Handbook

MULTIPLEX®

A Manitowoc Company

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In accordance with our policy of continuous product development and improvement, this information is subject to change at any time without notice.

00218009 Revision D July, 2002

Complete System Overview

Fountain Beverage Dispensing Equipment

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Ingredients Required to Manufacture Quality Carbonated Water

Good Quality CO_2

Multiplex Refrigeration Units are designed to operate properly on 90 psi (6.4 bar) of CO_2 pressure.

Clean Water

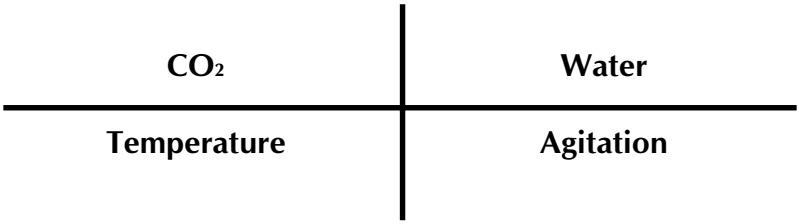
Carbonated drinks are made up of over 83% water. Clean water is required for good taste and to protect the equipment.

Cold Temperature

Multiplex Refrigeration Units use a cold carbonation system, water is carbonated in an ice cold water bath. It is very important to dispense drinks below 39°F (4°C).

Proper Agitation

Multiplex carbonation systems are designed to give you the exact amount of agitation to give you the proper carbonation.



Multiplex Post-mix Beverage System

Multiplex Post-mix beverage systems use filtered water from a **filtered water supply system** and chill it as it passes through stainless steel cooling coils located in an ice cold water bath.

The water bath is maintained at 32°F (0°C) by a mechanical **refrigeration system** which produces a large ice bank reserve to provide sufficient cooling for peak draw periods. This ice reserve allows a relatively small refrigeration unit to maintain drink temperatures, drawing form the ice reserve during heavy load periods and then re-establishing the ice bank during light draw periods.

The chilled water passing through the water bath is mixed with carbon dioxide (CO_2) in the **carbonated water supply system**. This is when and where it becomes carbonated water in the carbonation tank.

Syrup is also chilled as it passes through stainless steel cooling coils located in the ice cold water bath. Chilled, the syrup is connected to one of several beverage tubes contained within a **beverage conduit**. This conduit is then routed to a dispensing station.

The **circulating carbonated water supply system** allows for the circulation of carbonated water through use of a pump to create an outlet and inlet carbonated water supply. Outlet and inlet carbonated water supplies are connected to tubes contained within the same beverage conduit as the syrup. This allows carbonated water to flow from the water bath to the dispensing station and back, maintaining a constant beverage temperature throughout the system.

Ice cold carbonated water and syrup are dispensed from valves at the dispensing station. **Dispensing valves** contain flow controls which allow for flow adjustment to maintain the proper ratio of syrup to carbonated water. Syrup and carbonated water are released when the dispensing valves are opened. This allows mixing to begin as escaping products are allowed to flow through the valve nozzle. They continue to mix as they fall into the customer's cup to complete the production of a bottler-quality soft drink.

Water Filter System

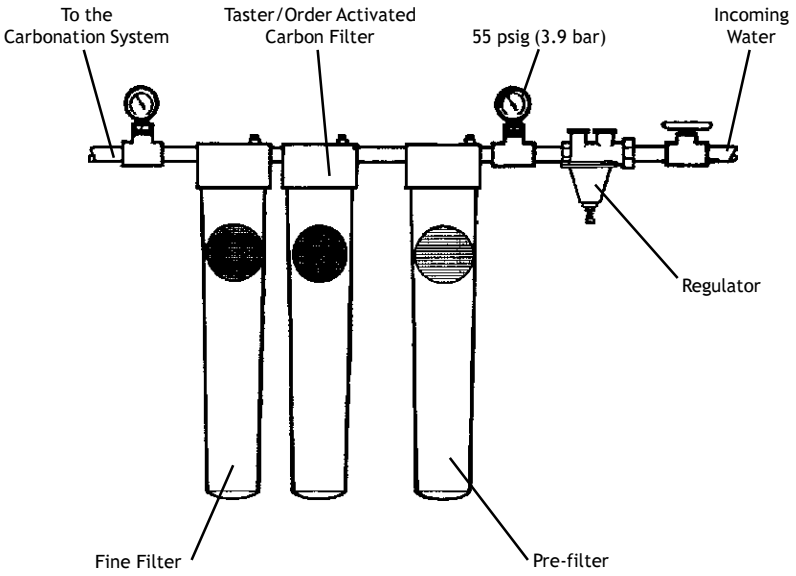
Incoming water pressure is to be maintained at 55 psig (3.9 bar) to ensure proper flow throughout the system. An in-line **water regulator** and **gauge** controls high water pressure and allows for pressure monitoring.

Water enters the **pre-filter(s)** that remove the coarse particles that are contained in the supply water, protecting the **fine filter**.

Water flows from the pre-filter(s) to the **taste/odor activated carbon filter**, absorbing taste and odor causing chemicals, such as chlorine and sulfur.

Finally, water runs through a **fine filter**, filtering out the finer particles left in the supply water, thus protecting the equipment and helping to insure quality water for carbonation.

Pressure gauges located before and after the filtration system allow the monitoring of pressure across the filter system, indicating clogged filters and the need for replacement.



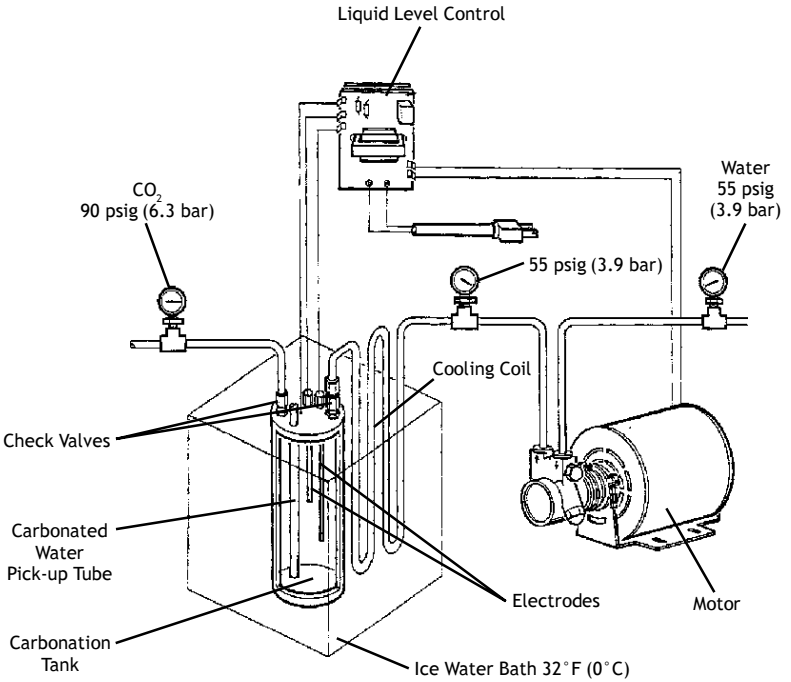
Carbonation System

Carbonator Pump "off"

Carbon dioxide (CO_2) regulated to 90 psi (6.3 bar) passes through a single check valve, which prevents water from backing up into the CO_2 supply, and fills the carbonator tank with CO_2.

The incoming filtered water at 55 psig (3.9 bar) feeds the brass carbonator pump, then proceeds through a stainless steel cooling coil located in the 32°F (0°C) water bath. Chilled water is then delivered to the double check valve on top of the carbonator tank. CO_2 is prevented from leaving the carbonator tank through the fresh water supply by the double check valve.

When the carbonator motor is **"off"**, the high CO_2 pressure within the carbonator tank prevents replacement water from entering the carbonator tank.

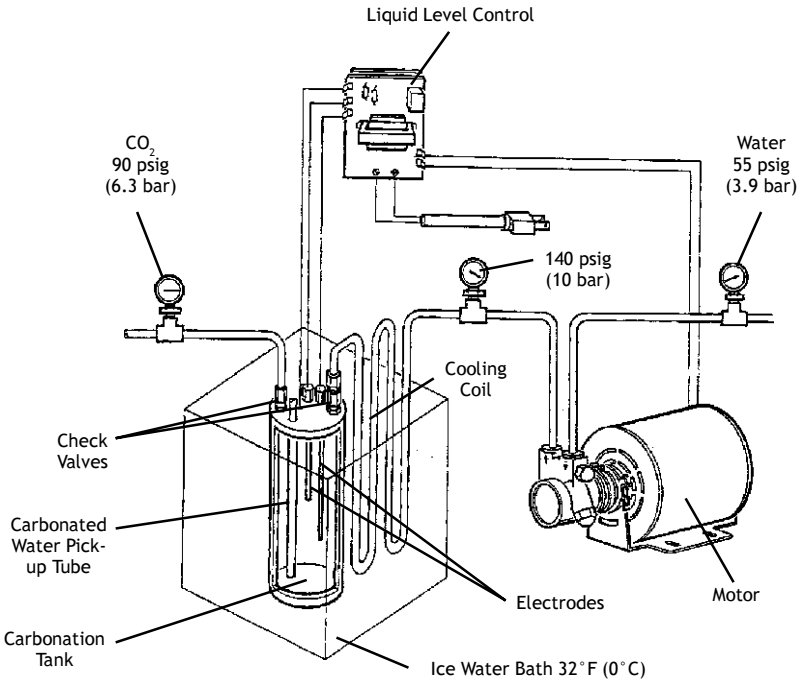


Carbonation System (continued)

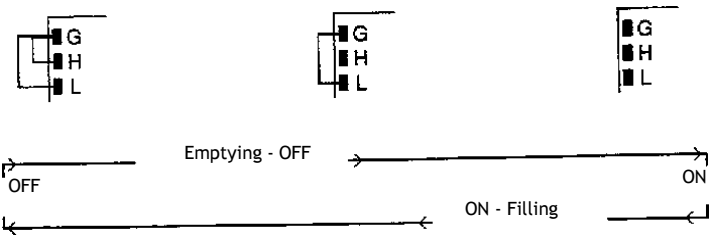
Carbonator Pump "on"

When the carbonated water level in the carbonator tank falls below both the **electrodes**, the **liquid level control** will send electricity to the carbonator motor. The motor turns the carbonator pump, which increases the water pressure from 55 psig (3.8 bar) to approximately **140 to 170 psig (10 to 12 bar)**. This boosted water goes through the cooling coil in the water bath, through the double check valve and overcomes the 90 psig (6.3 bar) CO_2 pressure within the carbonator tank. Water flowing through the orifice at the base of the check valve is broken into tiny droplets and sprayed into the carbonator tank, absorbing CO_2 to produce cold, quality carbonated water.

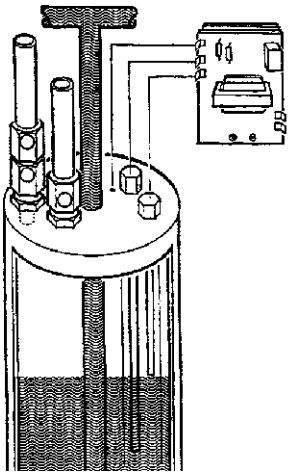
While the motor and pump is running, the carbonated water level in the tank will rise until it reaches the low and then the high electrode, at which point the liquid level control will shut **"off"** the electricity to the motor. Each time a sufficient amount of carbonated water is drawn from the carbonation tank, the cycle will repeat.



Liquid Level Control (Electrode Circuit)

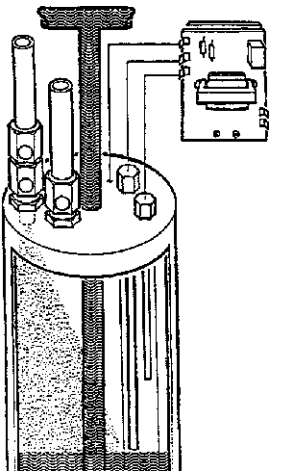


OFF



Power "off" to the Pump Motor

ON



Power "on" to the Pump Motor

Liquid Level Control (Electrode Circuit) (continued)

When the carbonator tank is full, carbonated water is touching both the low and high electrodes and the liquid level control will not supply power to the carbonator motor.

When carbonated water is drawn out of the tank, it will first fall below the **high electrode**. This opens the circuit between the **"G"** and **"H"** terminals of the liquid level control.

The continued draw of carbonated water from the tank will cause the level of carbonated water to fall below the low electrode. This opens the circuit between the **"G"** and **"L"** terminals of the liquid level control. With both circuits open, the liquid level control directs power to the carbonator motor and the pump, turning it **"on"** and replenishing the supply of carbonated water in the tank.

The carbonated water level will quickly rise to the low electrode and close the circuit between the "G" and "L" terminals of the liquid level control.

Continuing to pump water into the tank, the level will next rise to the high electrode and close the circuit between the "G" and "H" terminals of the liquid level control. This turns the motor **"off"** and stops water from being pumped into the tank.

The electrodes work with the liquid level control to maintain the level of carbonated water in the tank. Continuity through the carbonated water from both electrodes (low and high) to the tank (ground) turns the carbonator motor **"off"**. No continuity from both electrodes to the tank turns the carbonator motor **"on"**.

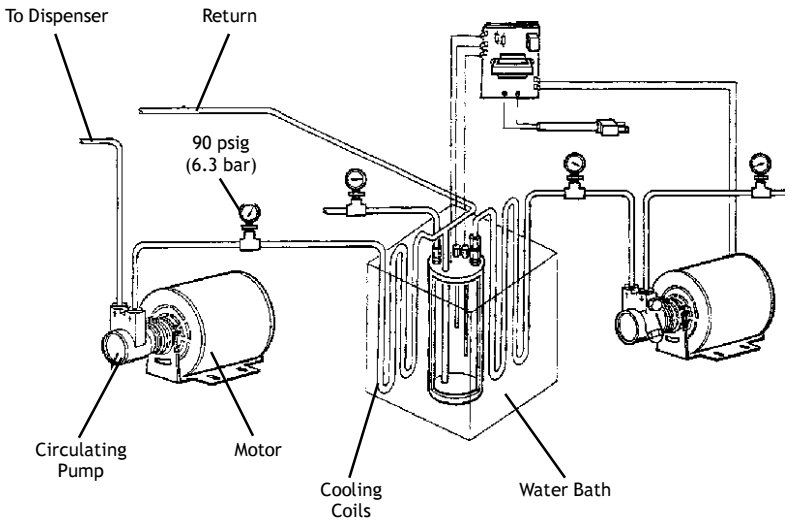
Circulating Carbonated Water Supply System

Cold, carbonated water is pushed from the carbonator tank by 90 psig (6.3 bar) of CO_2, up through the pick up tube and out of the carbonator tank. It is then chilled as it flows through the stainless steel cooling coil located in the 32°F (0°C) water bath. Feeding a stainless steel **circulating pump**, the chilled and carbonated water is then forced up to the dispensing station.

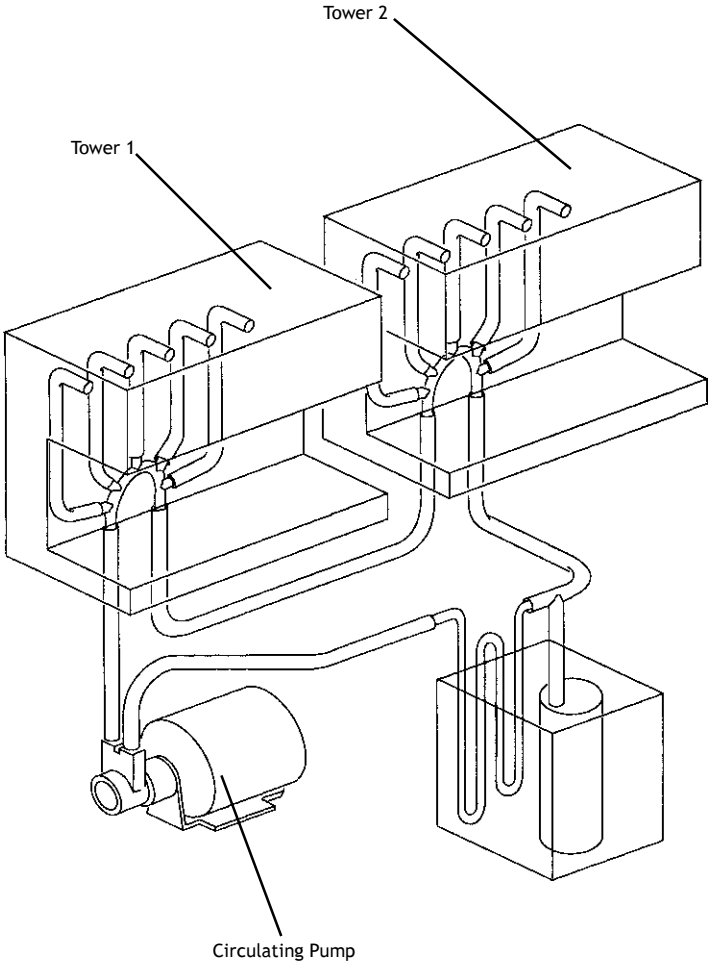
Carbonated water from the circulating pump is connected to one of the two carbonated water lines found within the **beverage supply conduit**. At the opposite end of the beverage conduit, the supply line, along with the remaining return carbonated water line, is connected respectively to the inlet and outlet ends of a turn-around manifold located in the beverage dispensing unit.

Returning carbonated water mixes with newly manufactured carbonated water as it is forced out of the tank to replenish the supply in the circulating loop.

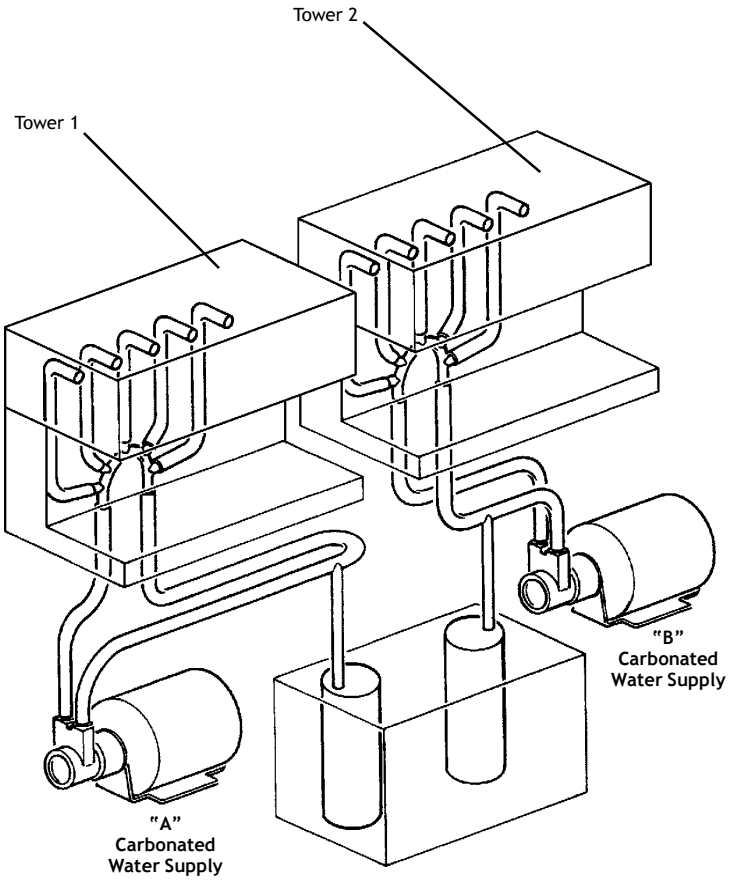
The circulating, carbonated water ensures that the syrups that are also contained within the beverage conduit are properly cooled and that all finished drinks are drawn at 39°F (3.9°C) or less.



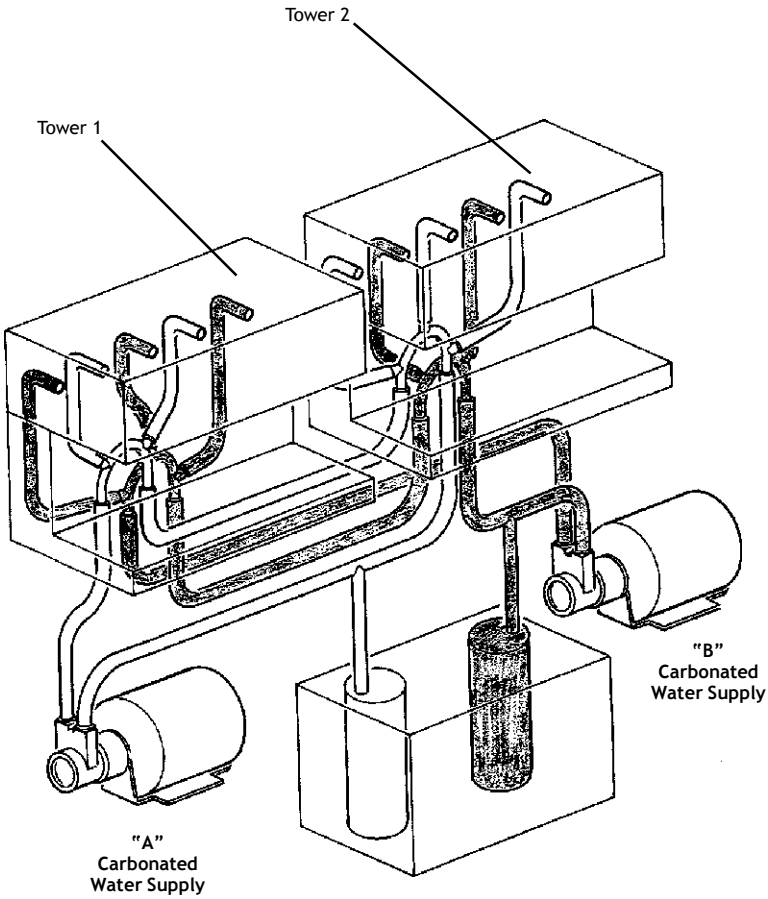
Single Carbonated Water Supply



Dual Carbonated Water Supply



Dual and Split Carbonated Water Supply

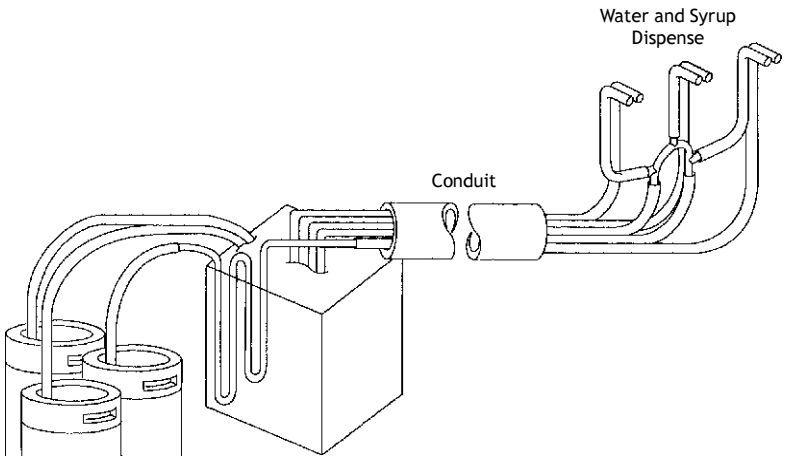


Dispensing System

Syrup at the refrigeration unit is pressurized and pushed through cooling coils located in the 32°F (0°C) water bath and then on to the dispensing valves. The push pressure is achieved by one of two methods. One way is by applying direct gas pressure (air or CO_2) on the surface of syrup stored in stainless steel syrup tanks (figals) which is then connected to the cooling coil. Another way is to use syrup pumps to draw syrup out of bag-in-box containers and then push the syrup through the cooling coils.

Cold syrup flows from the cooling coils and into the beverage conduit where it is then kept cool by circulating carbonated water to the final point of dispensing. Activating a dispensing valve allows syrup and carbonated water to escape through the diffuser/nozzle assembly of the valve. The actual mixing of the beverage occurs as the syrup and carbonated water enter the nozzle. As the beverage falls from the nozzle, it continues to mix until captured in the customer's cup, where mixing is completed.

To ensure consistent mixing, the dispensing valves are equipped with adjustable flow controls that react to line pressure changes, opening and closing orifices to keep a constant ratio of carbonated water to syrup.



Maintenance Schedule

This section provides a list of periodic maintenance tasks and the scheduled frequency required to ensure the proper operation of your Multiplex dispensing equipment. To ensure quality beverages, prevent down-time, and reduce costs, these tasks must be performed as indicated.

Periodic maintenance for soft drink equipment (listed by major components)

Dispensing stations

Daily (365 times per year)

- Take temperature of finished drinks. Pour off the first and take the temperature of the second drink. The proper temperature of drinks must be 40˚F (4˚C) or less.
- Remove nozzles and diffusers from each dispensing valve. Clean with soap and warm water (not hot). Rinse with carbonated water and reinstall.
- Flush all dispenser drains. Pour hot water down drains at closing.

Beverage conduits

Every 4 months (3 times per year)

- Inspect beverage conduits for damage. Re-insulate and seal any uninsulated areas.
- Inspect floor chases and seal any open chase ends.

Air compressor

Monthly (12 times per year)

- Drain condensate water from air compressor tank.

Every 4 months (3 times per year)

- Inspect air compressor filter and replace if clogged. Air filter must be replaced every 6 months.
- Inspect air compressor to verify cut-in at 70 psi (4.8 bar) and cut-out at 90 psi (6.3 bar). Adjust pressure switch if necessary.
- Inspect system for air leaks and repair as required.

Refrigeration unit

Every 4 months (3 times per year)

- Clean the refrigeration unit air-cooled condenser using a vacuum cleaner. If equipped with water-cooled condenser, verify the water discharge temperature is at 105˚F (41˚C). Adjust water modulating valve if necessary.
- Inspect water bath to verify water level is at the top of stand pipe. If below, add water and repair water makeup device. If excessive amount of water is flowing over stand pipe, locate leak within bath and repair.
- Inspect ice bank within the water bath to verify proper size ice bank and clarity. Look for uniform, 2" to 4" thick ice bank.
- Drain, clean, and refill water bath.
- Inspect agitator motor and ensure proper operation.
- Inspect the circulating motor/pump assembly. Clean strainer and oil motor.
- Inspect the carbonating motor/pump assembly. Clean strainer and oil motor.
- Inspect entire system for leaks and repair as required.

Maintenance Schedule (continued)

Periodic maintenance for soft drink equipment (listed by major components) (continued)

Water filters

Every 4 months (3 times per year)

- Verify that incoming water pressure is not less than 40 psi (2.8 bar) or greater than 60 psi (4.1 bar). If equipped with a water regulator, verify proper setting of 55 psi (3.8 bar). Adjust if necessary.
- If pressure is low, inspect water filter cartridges to ensure they are able to supply adequate water pressure under normal system flow. Replace if unable to provide minimum 20 psi (1.4 bar) under load.

Syrup supply

Daily (365 times per year)

- Clean general area of syrup hookup with soap and warm water. Rinse off all soap.

Every 4 months (3 times per year)

- Inspect syrup lines for proper flavor identification labels. Replace labels if necessary.
- Disconnect syrup containers. Clean connector with soap and warm water. Rinse with plain water and reconnect to syrup containers.

CO_2 gas supply

Every 4 months (3 times per year)

- Inspect pressure setting at CO_2 high pressure regulator. Verify proper 90 psi (6.3 bar) pressure setting. Adjust if necessary.
- Inspect pressure setting at syrup pressure regulators. Verify proper pressure setting. Adjust if necessary.
- Inspect system for CO_2 leaks, repair as required.

Maintenance Schedule (continued)

Periodic maintenance for soft drink equipment (listed by scheduled frequency)

Daily (365 times per year)

- Take temperature of finished drinks. Pour off the first and take the temperature of the second drink. The proper temperature of drinks must be 40°F (4°C) or less.
- Remove nozzles and diffusers from each dispensing valve. Clean with soap and warm water (not hot). Rinse with carbonated water and re-install.
- Flush all dispenser drains. Pour hot water down drains at closing.
- Clean general area of syrup hookup with soap and warm water. Rinse off all soap.

Every 4 months (3 times per year)

- Using Brix cup and syrup separator, check for proper carbonated water flows (standard flow: 5 oz. in 4 seconds, fast flow: 10 oz. in 4 seconds) and syrup to water ratios at each dispensing station. Adjust as required.
- Inspect beverage conduits for damage. Re-insulate and seal any uninsulated areas.

  Inspect floor chases and seal any open chase ends.
- Inspect air compressor filter and replace if clogged. Air filter must be replaced every six months.
- Inspect air compressor to verify cut-in at 70 psi (4.8 bar) and cut-out at 90 psi (6.3 bar). Adjust pressure switch if necessary.
- Inspect system for air leaks. Repair as required.
- Clean the refrigeration unit air-cooled condenser using a vacuum cleaner. If equipped with water-cooled condenser, verify the water discharge temperature is at 105°F (41°C). Adjust water modulating valve if necessary.
- Inspect water bath to verify water level is at the top of stand pipe. If below, add water and repair water makeup device. If excessive amount of water is flowing over stand pipe, locate leak within bath and repair.
- Inspect ice bank within the water bath to verify proper size ice bank and clarity. Look for uniform, 2" to 4" thick ice bank.
- Drain, clean, and refill water bath.
- Inspect agitator motor and ensure proper operation.
- Inspect the circulating motor/pump assembly. Clean strainer and oil motor.
- Inspect the carbonating motor/pump assembly. Clean strainer and oil motor.
- Inspect entire system for leaks and repair as required.
- Verify that incoming water pressure is not less than 40 psi (2.8 bar) or greater than 60 psi (4.1 bar). If equipped with a water regulator, verify proper setting of 55 psi (3.8 bar). Adjust if necessary.
- If pressure is low, inspect water filter cartridges to ensure they are able to supply adequate water pressure under normal system flow. Replace if unable to provide minimum 20 psi (1.4 bar) under load.
- Inspect syrup lines for proper flavor identification labels, replace labels if necessary.
- Disconnect syrup containers, clean connector with soap and warm water, rinse with plain water and reconnect to syrup containers.
- Inspect pressure setting at CO_2 high pressure regulators. Verify proper 90 psi pressure setting. Adjust if necessary.
- Inspect pressure setting at syrup pressure regulators. Verify proper pressure setting. Adjust if necessary.
- Inspect system for CO_2 leaks. Repair as required.

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00218010 Revision B (KAK) 31 July, 2000

Component Parts Workbook

Fountain Beverage Dispensing Equipment

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00218011 Revision B (KAK) 31 July, 2000

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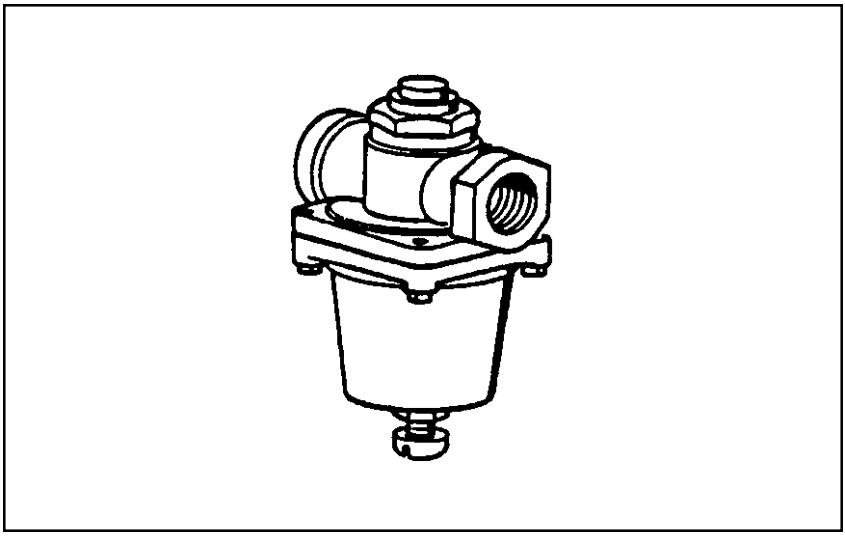
Water Regulator

Function of the water regulator

Regulates the incoming water pressure to 55 psi (3.8 bar) preventing "flooding" of the carbonator tank in locations with high water pressure.

Failure of the water regulator

An unregulated water supply can overcome the 90 psi (6.2 bar) CO_2 pressure in the carbonator tank and prevent the proper absorption of CO_2 into the water resulting in poor carbonation.



Notes:

- Look for fluctuations in pressure (poor city water pressure)
- To increase pressure turn clockwise
- Don't assume plumber flushed pipes
- Regulators can be taken apart and cleaned

Water Filter

Function of the water filter

Filters out both solid and suspended impurities found in the water supply. Preventing damage to components, insuring proper absorption of CO_2 into the water and a drink free of "off" taste.

Failure of the water filter

Solids

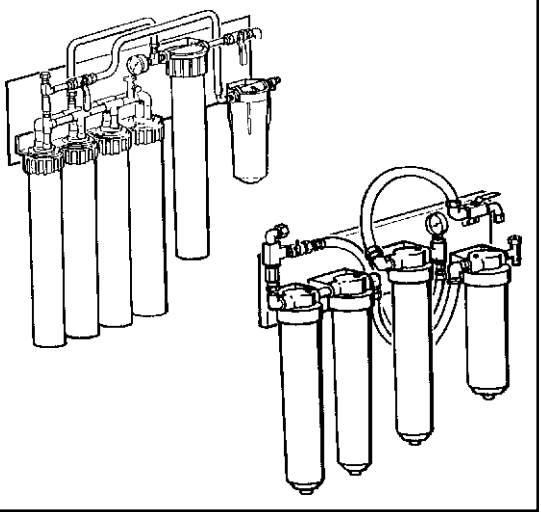
With use, filter will become restricted to the point of starving water pumps, effecting drink recovery rate.

Suspended

With use, filters will become saturated, effecting drink taste.

Activate Filter by (activate when system is not in use):

1. Put filter on by-pass.
2. Open activation valve (to relieve pressure).
3. Replace cartridge.
4. Slowly take filter off by-pass (leaving activation valve open).
5. Activate for proper amount of time.

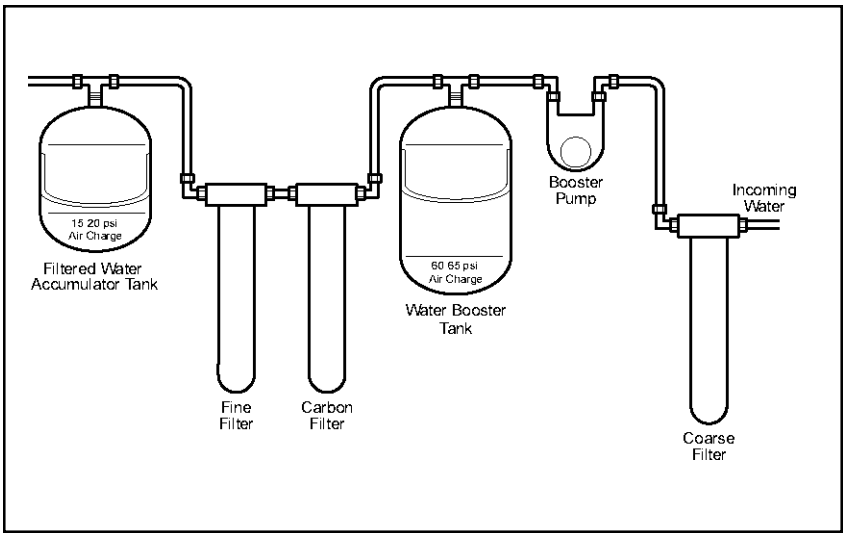


Notes:

- Examine water pressure gauge, if pressure drops 40 psi (2.8 bar) or more, when carbonator pumps cycle, put filter on by-pass and replace
- Must activate filter to fully coat element and allow for good filtration and filter life (Everpure only)
- Filter life is determined by:

  Filter Activation
  Water Volume
  Water Quality (dirt)
  Water Pressure

Accumulator Tank Pressures



Accumulator tanks have a rubber diaphragm in the middle of the steel tank, air is stored on one side of the diaphragm and water is stored on the other side, a plastic liner protects the steel from rust. Multiplex uses accumulator tanks for several purposes:

Water booster tank

A water booster pump is used to increase the incoming water pressure to 65 psi (4.5 bar) to 85 psi (6.0 bar). We then store that higher pressure water in an accumulator tank. As a result, the pump isn't running every time water is needed. The air in the tank gives the water a nice push out of the tank so that the water pressure slowly drops, allowing the pump to cycle on run for a short period of time and then cycle off. The air charge of this tank should be 60 psi (4.1 bar) to 65 psi (4.5 bar).

Filtered water accumulator tank

Filtered water is stored in an accumulator tank to be used when the carbonator pumps demand more water than will flow through your restricted water filters, and then slowly refill the tank when the pumps shut **"off"**. This enables you to use your filters for a longer period of time. The air charge of this tank should be 15 psi (1.0 bar) to 20 psi (1.4 bar).

The air charge in the tank should be filled or checked with no water pressure to the tank, because once you have water pressure applied to the tank the air will compress and equalize with the water pressure and you will get a false reading.

It is very important to use air and not CO_2 to charge the tank, because CO_2 will eventually bleed through the rubber diaphragm, thus reducing the charge in the tank.

On the bigger WX103 tank, when used as a water booster tank, it is critical to have the 60 psi (4.1 bar) to 65 psi (4.5 bar) air charge, because if the air pressure drops below 45 psi (3.1 bar), the diaphragm will break.

Primary Regulator

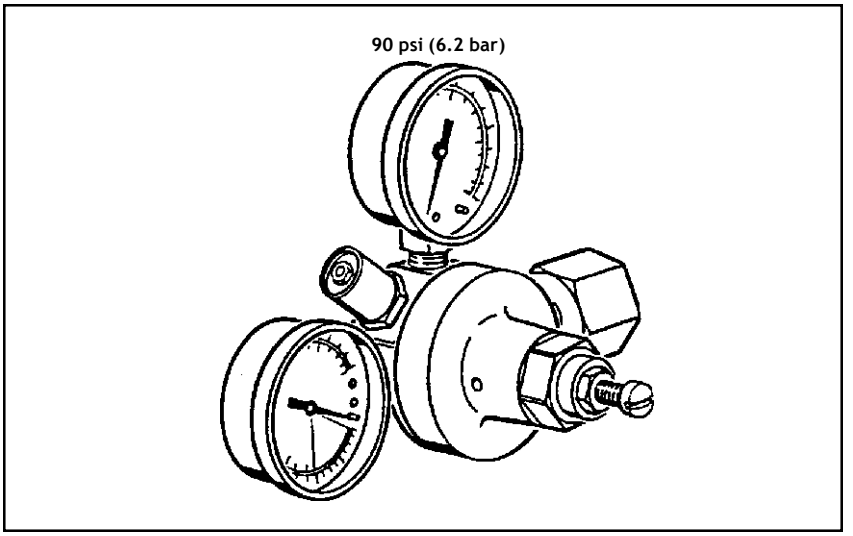
Function of the primary regulator

Regulates the CO_2 tank pressure to maintain a constant 90 psi (not over, not under) for the production of carbonated water.

Failure of the primary regulator

Low pressure or a "sluggish" regulator will cause poor absorption of CO_2 into the water resulting in poor carbonation.

High pressure or a "creeping" regulator will cause increased absorption of CO_2 into the water resulting in over carbonation.



Notes:

- Check with bubble soap around adjustment screw (for leaking diaphragm)
- Creeping can be caused by a faulty cartridge or a bad diaphragm
- CO_2 gas bursting from the relief valve on regulator could be caused by a defective or frozen regulator

Secondary Regulator (Syrup Regulator)

Function of the secondary regulator

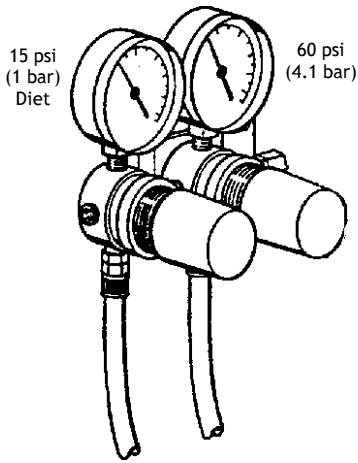
Regulates the CO_2 or air pressure used to push the syrups to the dispensing valves.

Failure of the secondary regulator

Low pressure or a "sluggish" regulator will cause an insufficient supply of syrup during dispensing, resulting in drinks that taste over carbonated (fast dispersing foam).

High pressure or a "creeping" regulator will cause increased supply of syrup during dispensing, resulting in drinks that taste flat and under carbonated (slow lingering foam).

- Letting syrup tanks to empty or a defective leaking syrup disconnect will cause air in the lines and foaming at the dispensing valve (especially at the slab stores with underground chases).
- To clear activate both valves at once until air clears.
- When jumping syrup tanks, always put the new thank on the front (syrup feed side) and move the partial tank to the back (gas feed side).



Notes:

- Check for leaks with bubble soap (always rinse soap from tubing).
- Cartridge could cause pressure to decrease, diaphragm could cause increase
- Sticking check/relief valve can cause lower pressure to a tank or allow syrup to back up into the regulator (remove front of regulator, check for syrup - can be cleaned with warm water)
- To increase pressure, turn clockwise
- Syrup tank disconnect not properly seated or defective could cause restriction

Carbonator Pump and Motor

Function of the carbonator pump and motor

Increases the pressure of the water, to overcome the CO_2 pressure and manufacture/replenish the carbonated water supply within the carbonator tank.

Failure of the carbonator pump and motor

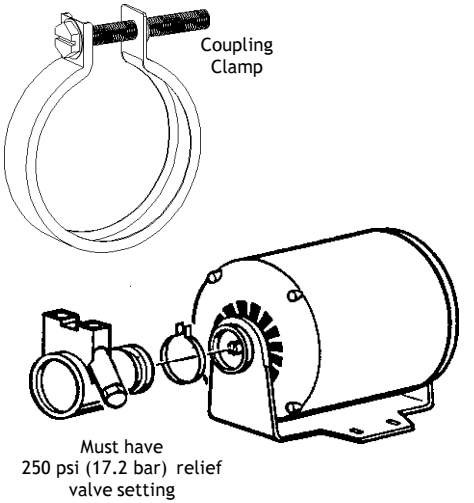
A weak or defective carbonator pump or motor (key) will cause poor carbonation and limit the capacity of the unit to manufacture carbonated water.

To determine the approximate cycle time:

1. Right after the carbonator kicks off, draw the carbonated water into a volume cup until the carbonator starts again.
2. Note how many ounces you have and multiply by 0.28 to determine how many seconds your cycle time should be.

   (100 GPH pump = 3.56 oz/second)

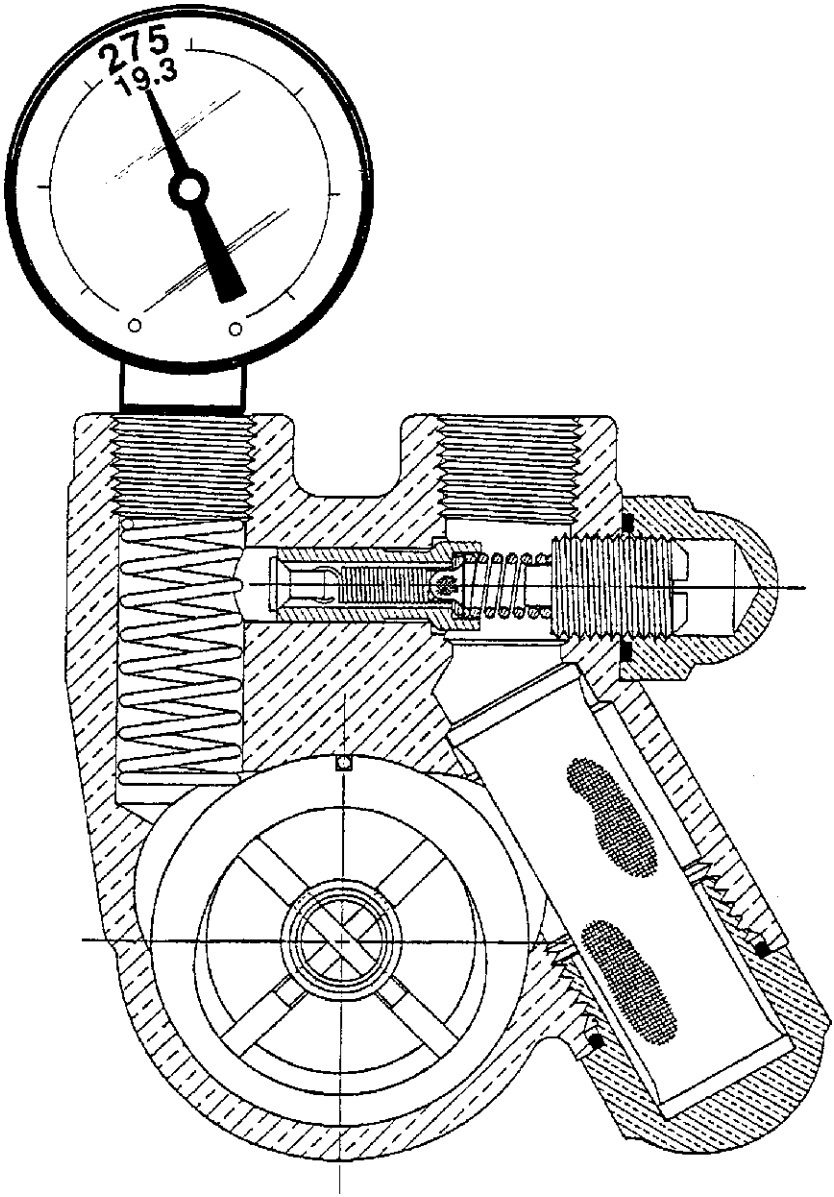
Note: *A unit with two 100 GPH pumps feed the same carbonator tank, multiply by 0.14*



Notes:

- Check water pressure with pumps running (10 psi [0.7 bar] minimum)
- To adjust relief valve setting, dead head to gauge (incoming water pressure + 250 relief setting)
- Check strainer
- Check for frozen coil in water bath (water to carbonator tank coil)
- Check for power to the motor
- Make sure pump turns freely

Carbonator Pumps



Carbonator Pumps (continued)

All Multiplex equipment requires carbonator pumps with a 250 psi (17.6 bar) relief setting.

- This relief valve is designed to relieve in emergency situations only (when you have a serious restriction on the outlet of the pump. For example, a freeze up of the cooling coil in the water bath, etc.)
- A standard carbonator pump has a 170 psi (12 bar) relief valve setting. Multiplex equipment generates quite a bit of back pressure, thus causing the standard 170 psi (12 bar) pump to relieve excessively. This causes wear to the relief valve, prematurely weakening the pump.

Determining the strength of a carbonator pump

***Note:** Do not be dispensing drinks during the test.*

1. Dispense carbonated water until the carbonator pump cycles on, then stop.
2. Wait for the carbonator to cycle **"off"**, then turn **"off"** the electrical switch for the carbonator.
3. Dispense exactly 50 fl oz (2 L) of carbonated water only.
4. Turn **"on"** the electrical switch for the carbonator and time how many seconds it takes to cycle **"off"**. This is the actual cycle time.
5. From the chart on the following page, determine the expected cycle time.

   For example:
   50 ounces x .28, for a 100 GPH pump = 14 seconds

   2 liters x 9.52 for a 378.5 LPH pump = 19 seconds
6. If your actual cycle time is much greater than your expected cycle time, your pump has been weakened and the capacity of your equipment has been reduced.

Carbonator pumps chart

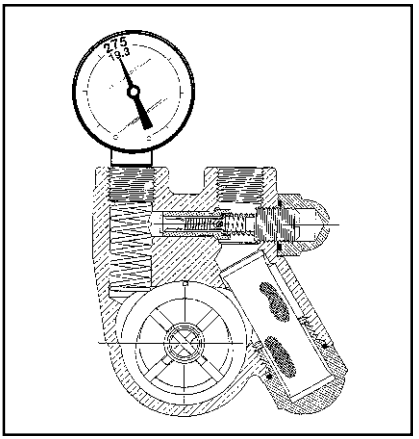
Gallon Per Hour	Ounces Per Second	Multiplier
100	3.56	0.28
125	4.44	0.23
200	7.11	0.14
240	8.53	0.12

Carbonator pumps metric chart

Liters Per Hour		Liters Per Second		Multiplier	
60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
378.5	318.2	0.105	0.088	9.52	11.36
473	397.6	0.131	0.110	7.63	9.09
757	636.3	0.210	0.177	4.76	5.65
908.5	763.7	0.252	0.212	3.97	4.72

Procedure for properly adjusting the relief valve setting on a pump

1. Remove the large acorn nut on the top side of the pump.
2. Mount a gauge on the outlet flow of the pump (as shown, to totally block the discharge flow).
3. Turn **"on"** the pump. While the pump is running, adjust the relief valve screw so that the gauge reads 275 psi (19.3 bar) (250 psi [17.6 bar] relief setting + 25 psi [1.7 bar] safety factor).
4. Reassemble.

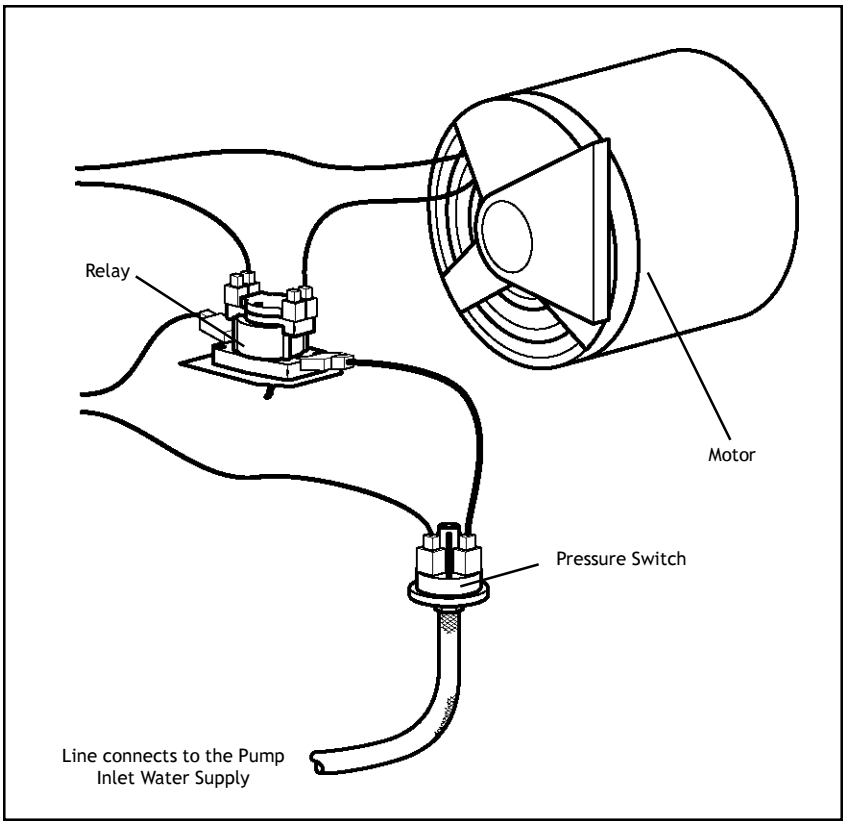


Low Water Pressure Safety Circuit

If water pressure is greater than 4 psi (0.3 bar), the pressure switch will be open and not allow electricity to pass, and the relay will be closed and allow electricity to flow to the motor.

If the water pressure drops below 4 psi (0.3 bar), the pressure switch will close and allow electricity to flow to the relay, heating the relay, causing it to open, stopping the electricity from flowing to the motor.

If the water pressure then goes above 4 psi (0.3 bar), the pressure switch will again open, stopping the electricity from flowing to the relay, the relay will start to cool, after about 3 minutes the relay will close, again sending electricity to the motor.



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Check Valves

Function of the check valves

Prevents the back-flow of a liquid or gas by allowing flow in one direction only.

CO_2 Check Valves

Single check valve for incoming CO_2 to prevent water from backing up into the regulator and CO_2 tank.

Water Check Valves

Double check valve and or back-flow preventer to keep CO_2 from backing up into the water supply, and to provide a "shower" of water into the carbonator tank to absorb more CO_2.

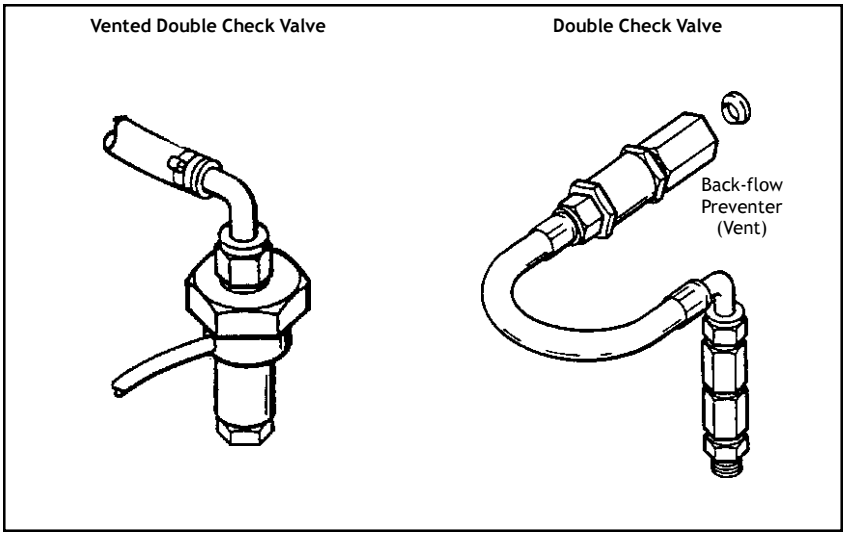
Failure of the check valves

CO_2 Check Valves

Liquid could back up into gas regulators and/or CO_2 tank causing damage.

Water Check Valves

CO_2 could back up into the plain water supply or cause back flow preventer to dispel CO_2 or water into the water bath.



Notes:

- Could restrict water flow if sticking
- Check for CO_2 escaping from vent hole or
- Slowly disconnect line from top of check valve, if anything is escaping, check valve needs to be cleaned or replaced

Water Bath Feeder

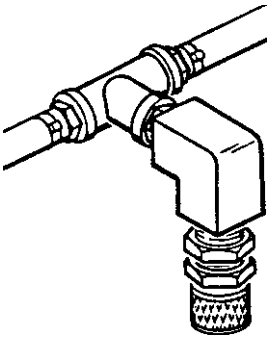
Function of the water bath feeder

To replenish water in the water bath and skim the surface preventing bacterial buildup.

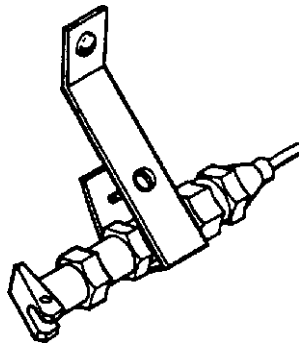
Failure of the water bath feeder

Restricted will not allow recovery resulting in low water level and dirt buildup. Uncontrolled flow will effect cooling capacity causing poor ice bank buildup.

Restrictor and adjustable Relief Valve



Cap Tube and 130 psi (9 bar) Relief Valve



Notes:

- Water released when the carbonator motor runs
- Old machines have float type fillers (when the water drops below the float level it allows more water into the bath)
- If water continually runs down the stand pipe, check the rubber seat in the relief valve or float

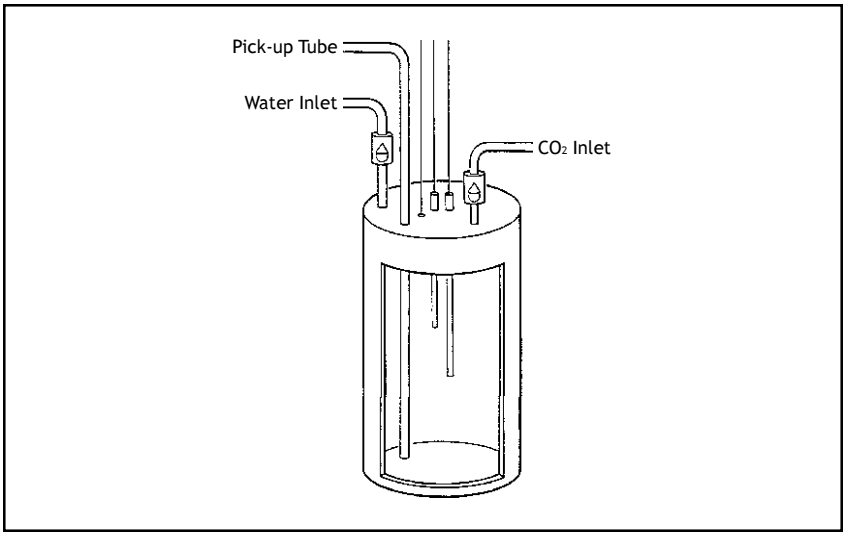
Carbonator Tank

Function of the carbonator tank

To provide a pressure vessel to mix water and CO_2 to manufacture/store carbonated water.

Failure of the carbonator tank

Stainless steel design insures relatively few problems. However, the many connection points require occasional checks for CO_2 or water leaks.



Notes:

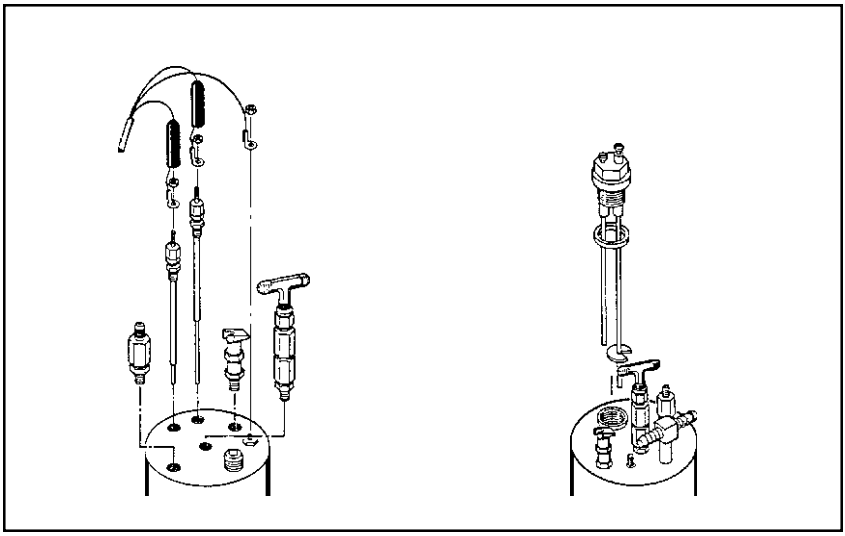
Electrode

Function of the electrode

Dual electrodes monitor carbonated water level in the carbonator tank. Electrodes signal the liquid level control and advise it of when to switch on the carbonator pump and motor.

Failure of the electrode

An open electrode circuit of insulated electrode(s) will cause the carbonator pump and motor to run continuously. Grounded electrodes will not allow the liquid level control to switch **"on"** the carbonator pump and motor. Shorted electrodes will cause short cycling of the carbonator pump and motor.

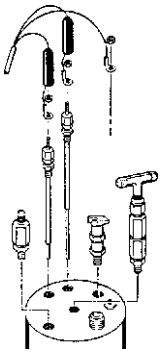
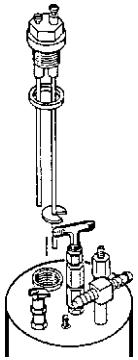
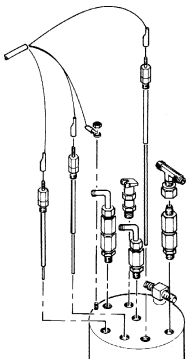
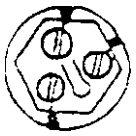


Notes:

- Could short cycle because of a short to ground or switched electrode wire leads
- Check for leaks in cap or gasket
- Check wires from liquid level control to electrode (broken, bare or shorted)

Electrodes

Special care must be taken to use the correct length electrodes in each carbonator tank. Below are listed the refrigeration units with correct size for each.

Electrode	Refrigeration Unit	Part Number	Probe Length
	Model 11H	Y0208031 Y0208032	7.9" Red 10.8" Black
	Model 2803	Y0208029 Y0208030	5.9" Red 8.8" Black
	Model 2000 Model 1200 Model 72 Model 50 Model 39 Model 38H Model 11	00701216 (1" Cap)	7.5" and 5.5"
	Model 3410 Model 3610 Model 50H Model 44 Model 37 Model 37F Model 37T	00210828 (1" Cap)	9.5" and 5.5"
	Model 44 Model 44K	Y0212106 Y0212105 Y0212104	6.2" Red 8.9" Black 11.6" White
	Model CPSS	Y0212104 00213554 00213553	11.6" White 9.5" Black 5.5" Red
	Model 44 (Limited Unit Run)	00701214 (1" Cap)	
	3-Probe Assembly	00211977 00211978 00211979	5.5" 6.9" 9.5"

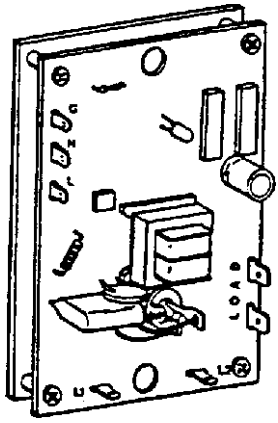
Liquid Level Control

Function of the liquid level control

Switches **"off"** and **"on"** the carbonator pump and motor when the electrodes indicate a full or empty tank. Continuity across L and H to G cause the liquid level control to switch **"off"** the carbonator pump and motor. Open circuits across L and H to G cause the liquid level control to switch **"on'** the carbonator pump and motor.

Failure of the liquid level control

Defective liquid level control will cause the carbonator pump and motor to run continuously or not at all.



Note: *For proper voltage meter reading, you must test to ground or you will get a ghost reading.*

Notes:

- 90% control fails closed (motor runs all the time)
  10% control fails open (motor does not run)
- If you start two pumps with one liquid level control, you must use the heavy duty 15 AMP control (P.N. 208162)

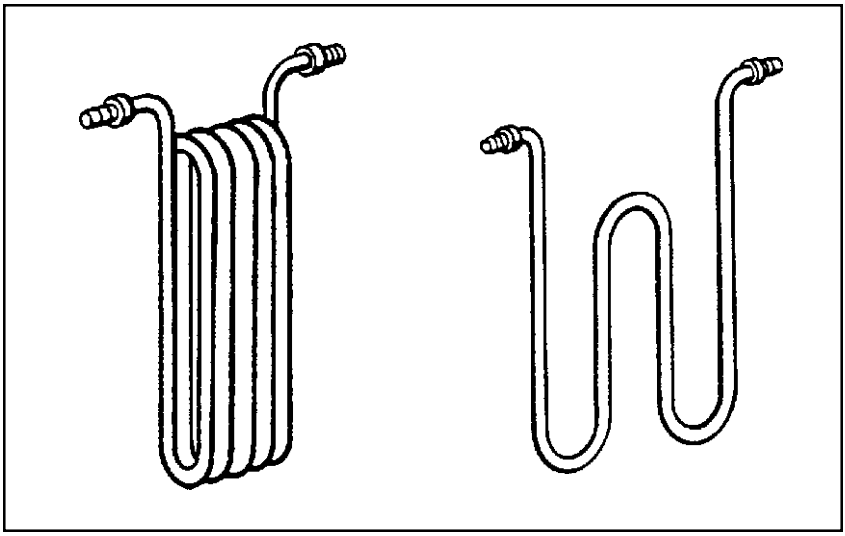
Cooling Coils

Function of the cooling coils

Located within the 32°F water bath. Coils allow heat to be removed from the syrup, water and carbonated water supply lines.

Failure of the cooling coils

Improperly located cooling coils found outside the designed retaining basket may freeze-up if touching the ice bank.



Notes:

- Check coils for freezing (ice touching the coils)

Circulating Pump and Motor

Function of the circulating pump and motor

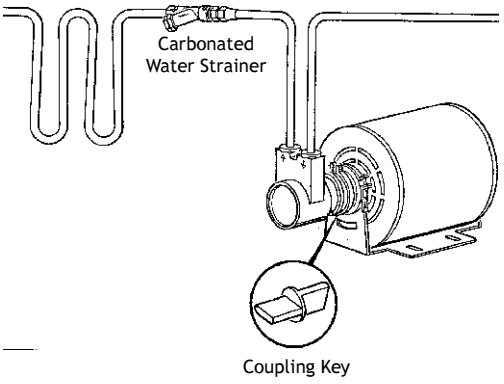
Circulates coils carbonated water from the refrigeration unit up to the dispensing valves and back to be re-chilled. This keeps the syrups, water and carbonated water continually chilled.

Failure of the circulating pump and motor

A weak or defective circulating pump or motor will cause warm drinks at the dispensing valves.

How to flush a contaminated system

1. Take the fittings off the circulating pump.
2. Plug one line.
3. Turn **"on"** water.
4. Turn **"off"** the water on the CO_2.
5. Plug other line.
6. Repeat.



Notes:

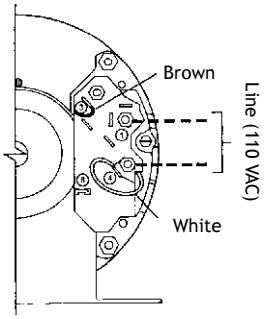
- Draw about one gallon of carbonated water if temperature drops, replace pump
- Verify motor is turning (check power to the motor)
- Verify coupling key is operational
- Verify pump turns freely
- Check carbonated water strainer (if equiped with machine)
- 100 gallon pump = fast flow system
  50 gallon pump = standard flow system
- When a pump goes out it can cause black specks to contaminate the carbonated water circuit (carbon veins in the pump breaking up) you must flush circuit

Alternate Suppliers for Carbonator/Circular Motors

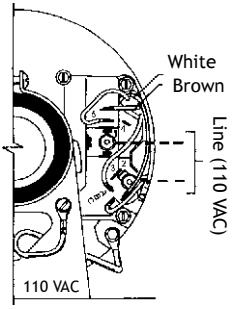
In 1992, Multiplex Engineering established P.N. 00213596 as the standard motor for all carbonator and circular motor applications. It is a 1/3 hp dual voltage (110-120/220-240 VAC), 50/60 Hz motor. Until recently, this motor was supplied to us only by General Electric.

We now have two additional sources, Motors & Armatures (MARS) and Emerson Electric. The MARS motor has been approved and authorized for production while the Emerson motor is undergoing life testing in our laboratory.

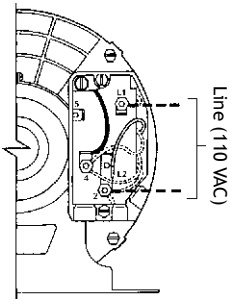
While all three motors are equivalent, the high and low voltage hookups are different for each motor. Illustrated below are the connections for high and low voltage for each motor.



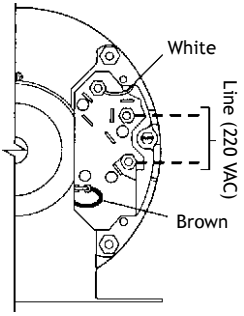
Emerson (110 VAC)



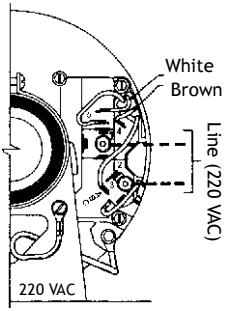
G.E. (110 VAC)



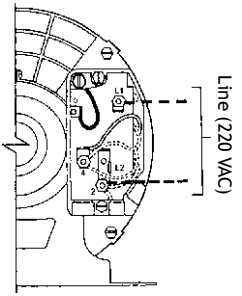
Mars (110 VAC)



Emerson (220 VAC)



G.E. (220 VAC)



Mars (220 VAC)

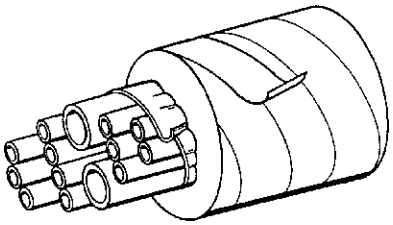
Conduit

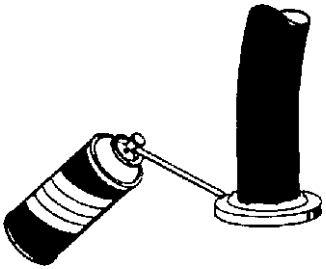
Function of conduit

Insulated beverage tubing used to move and maintain cold syrup, water, and carbonated water from the refrigeration unit to the dispensing station.

Failure of conduit

Temperature will not be maintained to the dispensing station if the conduit is improperly insulated or if the insulation becomes saturated.





Air tight seal to prevent foreign matter from entering the chase and prevent condensation.

Notes:

- Must be well insulated

Refrigeration Compressor

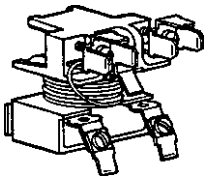
Function of the refrigeration compressor

Refrigeration pump which draws a low pressure gas on the cooling side of the refrigeration cycle and squeezes or compresses the gas into high pressure on the condensing side of the cycle.

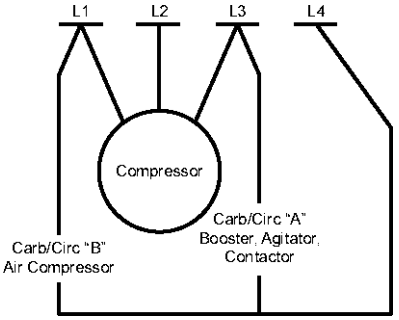
Failure of the refrigeration compressor

An inoperative or weak compressor would adversely effect the capability of the unit to manufacture ice.

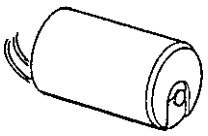
Start Relay
(relay over 1/3 hp looks like square box)
Start Relay starts the Compressor and then goes into the "run" mode.



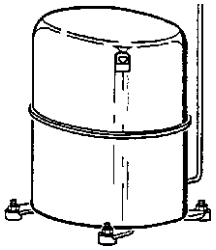
To install, look for a label marked "Top" or for " ↑ ".



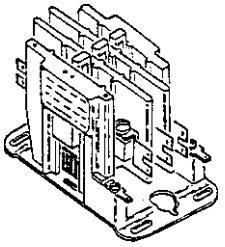
Can loose one leg, but it may be fuse and not contactor (use wire diagram).



Start capacitor (plastic)
Run capacitor (metal)
To test, use capacitor tester.



Refrigeration Compressor



Contactor
2-Pole Single Phase
3-Pole Three Phase

Notes:

- Check amp load on compressor
- Check water bath feeder, or for leak somewhere in water bath (look at stand pipe)
- Check cleanliness of condenser (temperature of water on water cooled units (100°F - 105°F)
- Check room temperature
- Check refrigeration charge

Multiplex Refrigeration Components

Unit	Refrig	Compressor		Start Relay	Start Capacitor	Run Capacitor
		Multiplex	Manufacturer			
2803A, 2803W, 75A	R-12	00755104	EMB-E5187B-117VG20 (0.33 hp, 1 Phase, 115 VAC)	00755106 Aspera 175 MFD 165 VAC	00215135 145-TI9660040182	N/A
2803AX, 2803W	R-12	00755107	EMB-E5187A-117CA20C (0.33 hp, 1 Phase, 220 VAC)	00755109 Aspera TI9660040182	00215135 (145-175 MFD 165 VAC)	N/A
2803A, 2803W	R-22	00213997	EMB-E6210E-217RA (0.33 hp, 1 Phase, 220 VAC)	00755109 Aspera TI9660040149	00215135 (145-175 MFD 165 VAC)	N/A
150A	R-12	00755099	TEC-AJ6435A-AJ311BT-124C4 (0.5 hp, 1 Phase, 115 VAC)	00207166 Aspera TI9660040149	00207186 (88-106 MFD 165 VAC)	N/A
11A	R-12	00755090	TEC- 165-B4, AJ7441A-AJ530AT (0.5 hp, 1 Phase, 115 VAC)	00755302 Tecumseh 82498-1	00801241 (378-455 MFD 125 VAC)	N/A
2803A, 2803W, 75A	R-12	00213979	EMB-E6210E-217RG20 (0.33 hp, 1 Phase, 115 VAC)	00755109 Aspera TI9660040149	00215135 (145-175 MFD 165 VAC)	N/A
4205A	R-12	00211108	AJ7441A-AJ530AT-165-A4 (0.5 hp, 1 Phase, 115 VAC)	00755022 GE 3 ARR3-AZJ6	00755023 (270-324 MFD 110 VAC)	00755024 15 MFD 370 VAC
4205HA, 150MA, 11MA	R-22	00212830	AK9442E-AK165AT-035-B4 (0.5 hp, 1 Phase, 115 VAC)	00755302 Tecumseh 82498-1	00801241 (378-455 MFD 125 VAC)	N/A
11AZ	R-12	00755092	AJ7441A-AJ530J-165-B4 (0.5 hp, 1 Phase, 240 VAC)	GE 3AARZ KCR1765	No P.N., (121-146 MFD 250 VAC)	N/A
38R	R-12	00755021	AJ7465A-AJ201AT-206-A4 (0.75 hp, 1 Phase, 115 VAC)	00755022 GE 3 ARR3-AZJ6	00755023 (270-324 MFD 110 VAC)	00755024 (15 MFD 370 VAC)
38H, 38A, 38R, 38W, 39SC, 38HAC	R-12	00755095	TEC-AJ7465AB-AJ201AT-206-B4 (0.75 hp, 1 Phase, 115 VAC)	00755022 GE 3 ARR3-AZJ6	00755023 (270-324 MFD 110 VAC)	00755024 (15 MFD 370 VAC)
300MA, 44KW, 44W, 300A	R-502	00211147	TEC-AK947J-AK160ET-032-C4 (0.75 hp, 1 Phase, 230 VAC)	00211173 Mars 19003	No P.N. (72-88 MFD 250 VAC)	00755024 (15 MFD 370 VAC)
38HAX, 38HWX	R-12	00755080	AJ465BBX-AJ201JT-206-B4 (0.75 hp, 1 Phase, 240 VAC)	00801236 GE ARRZ-KCR1715	00801237 (108-130 MFD 330 VAC)	N/A
11MAX	R-22	00214229	TEC-AK9455EBX-AK167JT-035-B4 (1 hp, 1 Phase, 230 VAC)	00208926 GE ARR3 ASUZ	00208927 (216-259 MFD 250 VAC)	00208928 (25 MFD 370 VAC)
44A, 44R, 44KA, 44KR	R-12	00755097	TEC-AH7480A-AH160FT-083-A4 (1.4 hp, 1 Phase, 230 VAC)	00207947	00755077 (135-155 MFD 330 VAC)	00755024 (15 MFD 370 VAC)

Multiplex Refrigeration Components (continued)

Unit	Refrig	Compressor		Start Relay	Start Capacitor	Run Capacitor
		Multiplex	Manufacturer			
4210R	R-22	00213366	TEC-AJ9484E-AJ801ET-361-B4 (1 hp, 1 Phase, 230 VAC)	00208926	00208927 (216-259 MFD 250 VAC)	00208928 (25 MFD 370 VAC)
3610A, 3610R, 450A, 3410A, 3410R	R-502	00208929	TEC-AJ9510K-AJ201HT 206-H4 (1 hp, 1 Phase, 230 VAC)	00208926 GE ARR3 ASUZ	00208927 (216-259 MFD 250 VAC)	00215942 (25 MFD 370 VAC)
44KX, 44KAX, 44KR, 44X, 44A, 44R	R-12	00755098	TEC-AH7480A-AH160JT-1680A4 (1 hp, 1 Phase, 230 VAC)	00207947 Tecumseh 820AR13C31	00755077 (135-155 MFD 330 VAC)	00755024 (15 MFD 370 VAC)
50A, 50W	R-12	00755082	TEC-AH7514A-AH3334ET-108-A4 (1.5 hp, 1 Phase, 230 VAC)	00201073 Tecumseh 82477	00201075 (88-108 MFD 250 VAC)	00201074 (35 MFD 370 VAC)
4KX, 44M, 44MX, 44A, 44R, 44W, 3610MR	R-22	00212975	MAN-MT-18JA-1 (1.8 hp, 1 Phase, 230 VAC)	00211173 Mars 19003	00212977 (88-108 MFD 250 VAC)	00212976 (15 MFD 440 VAC)
37F, 37T, 50H, 50A, 50R, 50W	R-12	00202124	TEC-AH7514A-AH334RT-108-A4 (1.5 hp, 3 Phase, 230 VAC)	N/A	N/A	N/A
37X, 50HX, 50A, 50R, 50W	R-12	00202842	TEC-AH4525A-AH303TT-128-A4 (2.0 hp, 2 Phase, 380 VAC)	N/A	N/A	N/A
50MA	R-22	00213594	MAN-MT22JC-3 (2.2 hp, 3 Phase, 380 VAC)	N/A	N/A	N/A
50MAX	R-22	00213595	MAN-MT22JC-4 (2.2 hp, 3 Phase, 380 VAC)	N/A	N/A	N/A
50MR, 37M, 37A, 37R, 37W	R-22	00212979	MAN-MT28JE-3 (2.8 hp, 3 Phase, 380 VAC)	N/A	N/A	N/A
37MX, 37A, 37R, 37W, 50MRX, 37KX	R-22	00212980	MAN-MT28JE-4 (2.8 hp, 3 Phase, 380 VAC)	N/A	N/A	N/A
HC900504, HC900-04	R-404A	00215805	CPLND-R564CIE-CAA-232 (0.75 hp, 1 Phase, 115 VAC)	00215816 Copeland 040-0001-38	00215814 (72-86 MFD 350 VAC)	00215815 (30 MFD 440 VAC)
38MA04M, 38MA04	R-404A	00215805	CPLND-R564CIE-CAA-232 (0.75 hp, 1 Phase, 115 VAC)	00215816 Copeland 040-0001-38	00215814 (72-86 MFD 350 VAC)	00215815 (30 MFD 440 VAC)
HC900X04, 44KAX04	R-404A	00215799	CPLND-R597-CIE-CAZ-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-105 MFD 250 VAC)	00214943 (25 MFD 440 VAC)

Multiplex Refrigeration Components (continued)

Unit	Refrig	Compressor		Start Relay	Start Capacitor	Run Capacitor
		Multiplex	Manufacturer			
44MAX04, 44MAX04E	R-404A	00215799	CPLND-R597-CIE-CAZ-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-105 MFD 250 VAC)	00214943 (25 MFD 440 VAC)
150A04, 11MA04	R-404A	00215878	TEC-AK9451Z-AK170AT-032-A4 (0.5 hp, 1 Phase, 230 VAC)	00215943 Tecumseh 820ARR3D10	00215941 (72-88 MFD 250 VAC)	00215942 (25 MFD 370 VAC)
2803AX04, 75A04	R-404A	00215881	TEC-AK174JT-035-B4 (0.33 hp, 1 Phase, 115 VAC)	00215967 Tecumseh 82494-1	00215969 (72-88 MFD 250 VAC)	N/A
2803A04, HC180-04, 2803A04B, 75A04	R-404A	00215880	TEC-AK94272-AK174AT-035-B4 (0.33 hp, 1 Phase, 115 VAC)	00755302 Tecumseh 8294-1	00215968 (161-193 MFD 165 VAC)	N/A
300MA04	R-404A	00215423	CPLND-RS97C1E-CAV-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-108 MFD 250 VAC)	00214943 (25 MFD 440 VAC)
300MAX04, 44MX, 44MA, 44MR, 44MW	R-404A	00215799	CPLND-RS97-CIE-CAZ-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-108 MFD 250 VAC)	00215798 (30 MFD 370 VAC)
38HA39, 38HA, 38HW, 38HAC	R-404A	00755095	TEC-AG201AT-206-B4 (0.75 hp, 1 Phase, 240 VAC)	00755022 GE 3ARR3-A2J6	00755023 (270-324 MFD 110 VAC)	00755024 (15 MFD 370 VAC)
38HA, 38HR, 38HW	R-404A	00755095	TEC-AG201AT-206-B4 (0.75 hp, 1 Phase, 240 VAC)	00755022 GE 3ARR3-A2J6	00755023 (270-324 MFD 110 VAC)	00755024 (15 MFD 370 VAC)
38HAX39, 38HAX, 38HW	R-404A	00755080	TEC-AJ201JT-206-B4 (0.75 hp, 1 Phase, 240 VAC)	00801236 GE 3ARR2 KCR1715	00801237 (108-130 MFD 330 VAC)	N/A
44KA04, 44MA04, 44MA04E	R-404A	00215423	CPLND-RS97CIE-CAV-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-108 MFD 250 VAC)	00214943 (25 MFD 440 VAC)
450MA04, 450MR04, 450MW04, 50MA04	R-404A	00215457	MAN-MTE22-JC3L (2.2 hp, 3 Phase, 203 VAC)	N/A	N/A	N/A
50MAX04	R-404A	00215922	MAN-MTE22-JC4 (2.2 hp, 3 Phase, 230 VAC)	N/A	N/A	N/A
3610R404C	R-404A	00215423	CPLND-RS97CIE-CAV-232 (1 hp, 1 Phase, 230 VAC)	00215424 Copeland 040-0001-19	00201075 (88-108 MFD 250 VAC)	00214943 (25 MFD 440 VAC)

Normal Operating Pressures of Domestic Refrigeration Units

Head pressure of domestic refrigeration units

	R-12 psig	R-502 psig	R-22 psig	R-134A psig	R-404A psig
75°F Condenser Ambient 10-100% Ice on Evaporator	100-140	200-260	180-240	110-160	210-280
90°F Condenser Ambient 10-100% Ice on Evaporator	120-170	230-300	210-280	130-180	240-320

Evaporator pressure of domestic refrigeration units

	R-12 psig	R-502 psig	R-22 psig	R-134A psig	R-404A psig
75°F Evaporator, or 80°F Water	75	140	130	75	150
10-100% Ice on Evaporator	9-20	30-50	24-44	6-18	33-55

1. On system with expansion valve (pressure limiting) evaporator gets no higher than:

   50 psig on R-12
   53 psig on R-502
   85 psig on R-22

2. Water system head pressure should be manually set (adjustable water control valve) to maintain 105°F water condenser out temperature.
3. Remote Condenser system head pressure will be controlled by Low Ambient Control.

   75 psig on R-12, R-134A
   150 psig on R-502, R-22, R-404A

Normal Operating Pressures of International Refrigeration Units

Head pressure of international refrigeration units

	R-12 bar	R-502 bar	R-22 bar	R-134A bar	R-404A bar
24°C Condenser Ambient 10-100% Ice on Evaporator	6.9-9.7	13.8-17.9	12.4-16.5	7.6-11.0	14.5-19.3
32°C Condenser Ambient 10-100% Ice on Evaporator	8.3-11.7	15.9-20.6	14.5-19.3	8.9-12.4	16.5-22.1

Evaporator pressure of international refrigeration units

	R-12 bar	R-502 bar	R-22 bar	R-134A bar	R-404A bar
24°C Evaporator, or 27°C Water	5.2	9.7	9.0	5.2	10.3
10-100% Ice on Evaporator	0.6-1.4	2.1-3.4	1.7-3.0	0.4-1.2	2.3-3.8

1. On system with expansion valve (pressure limiting) evaporator gets no higher than
   3.4 bars on R-12
   3.7 bars on R-502
   5.9 bars on R-22
2. Water system head pressure should be manually set (adjustable water control valve) to maintain 41°C water condenser out temperature.
3. Remote Condenser system head pressure will be controlled by Low Ambient Control
   5.2 bars on R-12, R-134A
   10.3 bars on R-502, R-22, R-404A

Condenser

Function of the condenser

A heat exchanger which transfers heat from the refrigerant to the surrounding air or water.

Failure of the condenser

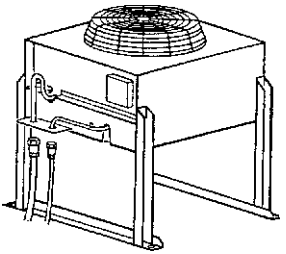
Air Cooled Condenser

A non operational fan/motor or restricted condenser will reduce the cooling efficiency of the refrigeration unit.

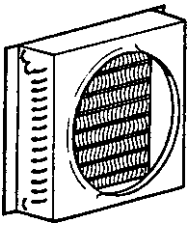
Water Cooled Condenser

A restricted water supply to the condenser will reduce the efficiency of the refrigeration unit, a water modulating valve that is stuck open will additionally waste water.

Remote Cooled Condenser
(use refrigeration oil)



Air Cooled Condenser



Water Cooled Condenser

Notes:

- Water cooled condensers should have water exiting condenser 100°F to 105°F regulator adjusts water flow to refrigerant pressure (higher pressure, more flow)
- Clean condenser monthly

Equipment Installation Instructions for Multiplex Remote Condenser and Pre-charged Refrigeration Lines

Pre-installation requirements

Multiplex Remote Condenser Requirements

1. Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of equipment.
2. Equipment of this type is intended for installation by qualified refrigeration mechanics. As a condition of the warranty, the check test and start-up procedure must be performed by qualified personnel. Because of possible shipping damage, both the Condensing Unit and Refrigeration Unit(s) must be checked for refrigerant leaks.
3. Check to insure that the Remote Condensing Unit, the Refrigeration Unit, and the Charged Refrigerant Lines are marked with the same refrigerant.

Multiplex Pre-charged Refrigeration Lines Requirements

1. Both the Discharge and Liquid Remote Condensing lines should be kept to a minimum distance for maximum performance. All Multiplex systems are capacity rated to 100 ft (30.5 m) distance between the Compressor and Condenser. Systems with distances greater than this will experience some efficiency loss in proportion to the distance. This should be a minor capacity loss, less than one drink per minute up to 300 ft (90 m).
2. Any vertical rise greater than 25 ft (7.62 m) must have a manufactured or installed trap (bend), in at least the Discharge Remote Condenser Refrigeration Line. A trap is necessary for every additional 25 ft (7.62 m) vertical rise. When excessive vertical rise exists, this trap allows oil to reach the Condenser and return to the Compressor.

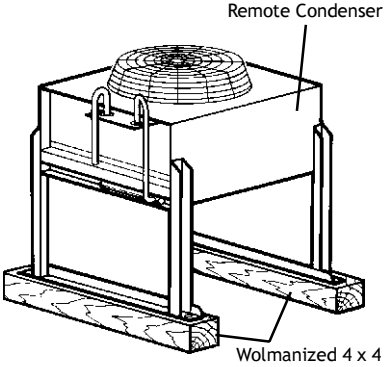


Figure 1

EI216524

3. The easiest method to create a trap, is to bend the tubing (smoothly, no kinks) into the trap form (refer to figure 3).
4. This trap(s) should be of minimum height of 3" (7.6 cm) and a width of 6" (15.2 cm) to minimize oil accumulation.
5. It is critical that the Multiplex Remote Condensing line size specifications for the specific model, be maintained. The specifications are normally $^{1}/_{2}$" discharge and $^{3}/_{8}$" ID liquid lines.

Installing the multiplex remote condenser

The Multiplex Remote Condensing Units have either a **230 Volt, 50/60 Hz, 1 PH** Fan Motor or a **120 Volt, 50/60 Hz, 1 PH** Fan Motor that includes a permanent split capacitor and internal inherent overload protection. Motors are factory wired to an external disconnect switch located on the end of the unit. Refrigeration unit has an electrical nipple extending out of the back left side with the electrical wires from the refrigeration contactor extending through. The electrician must install an electrical box at this location. Connect the conduit to this box and the Remote Condenser. The electrical installation should be in accordance with local codes, National Electrical Code and regulations. Proper fuse protections should be provided for the Fan Motor.

1. Determine a position for installation that will allow access for maintenance and is free from obstruction.
2. Install the four (4) legs to the sides of the condenser using the mounting bolts provided.
3. Secure two (2) treated 4" x 4" to the roof or mounting surface. Mount to the Remote Condenser (refer to figure 1).
4. Install a 3" Pitch Pot in the roof (refer to figure 2). Seal for weather protection.
5. Locate the Pre-charged Refrigeration Lines shipped with the system. These lines should be a correct length for the building design. Neatly avoiding any kinks, route these lines from the Remote Condenser to the Refrigeration Unit.

Caution: *Excess refrigeration line should be coiled and placed in a horizontal (flat) position. When stored in a vertical position, the loops act as an oil trap and will effectively reduce the performance of our equipment as well as increase the risk of compressor failure.*

Equipment Installation Instructions for Multiplex Remote Condenser and Pre-charged Refrigeration Lines (continued)

Connecting the pre-charged refrigeration lines

Note: *Before connecting the Pre-charged Refrigeration Lines, the Refrigeration Unit must be properly located, leveled, and the water bath filled 1" (2.5 cm) below the drain pipe.*

1. Attach low side Gauge Set to service port on each line set to verify positive pressure within the line set. If there is positive pressure, assume line set is fully charged.

Note: *If for any reason the lines are damaged and/or leaking or lines are no longer charged, refer to "**How To Re-charge the Line Sets**".*

2. Always make the connections at the Condenser first, using the end of the Pre-charged Lines with the valve ports.
3. Connect the Condenser side one time quick connects (discharge and liquid) up to Condenser. Refer to the section titled **"Aeroquip Connection"** in these instructions.
4. Check that the sight glass clears during pull down to verify the Line Set charge.
5. If the sight glass does not clear, attach the gauges. Adjust the charge if necessary.

How to re-charge the line sets

Note: *This procedure to be used **only** with damaged or evacuated Line Sets or with unknown refrigerant type.*

1. Repair any damages to the Line Sets before proceeding.
2. With the Remote Condenser lines properly hooked and sealed to the Condenser, evacuate to 30 in mercury (76.2 cm mercury) for 1 hour, using one or both Schrader ports on the service Line Set.
3. Charge the Condenser and Line Set accordingly. Add 0.72 oz/ft (0.067 kg/m) of Remote Line Set (one way run distance) plus 6 oz (170 g) of refrigerant for any size Condenser.

   Example:
   50 ft of Line Set

   50 x 0.72 = 36 oz

   36 oz + 6.0 oz = 42.0 oz (Total)
4. Connect Line Sets to the proper discharge and liquid mating connectors on the Refrigeration Unit using one (1) time quick connects. Refer to the section titled **"Aeroquip Connection"** in these instructions.

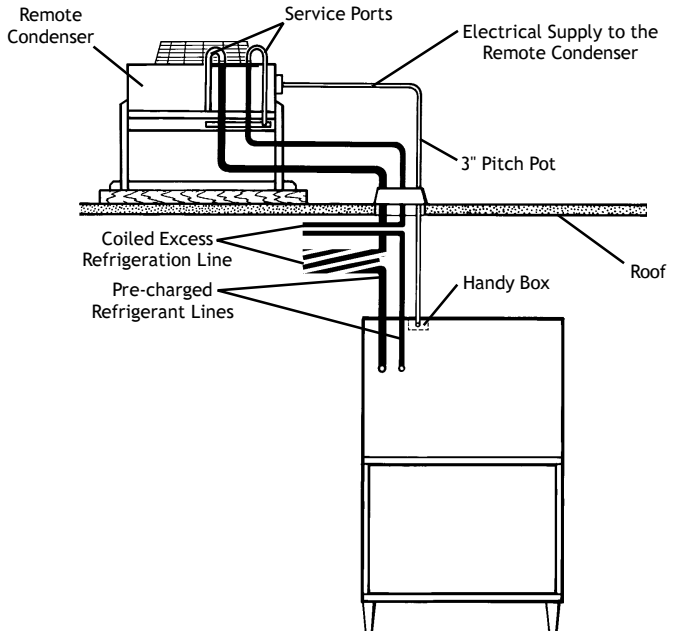


Figure 2

EI216524

Equipment Installation Instructions for Multiplex Remote Condenser and Pre-charged Refrigeration Lines (continued)

5. Be sure to observe proper refrigeration technique when running the Line Set.

   Proper Refrigeration Technique for Running the Line Set

   a. The discharge line should loop down at the Compressor end to trap liquid from returning (refer to figure 3).

   b. The Discharge Line should loop above discharge connector at the Condenser to resist liquid returning to the Compressor. Any excess line should be coiled horizontally with line from the Compressor at top and line to the Condenser at bottom to keep from trapping oil and returning liquid.

   c. Discharge line should be trapped (P Trap) every 20-25 ft (6.1-7.6 m) of vertical rise, to allow oil to "stair-step" up to the Condenser and eventually return to the Compressor.

Note: *When the connections are made, the seal in the couplings are broken and if removed for any reason, the refrigerant charge will be depleted.*

Caution: *Relays and terminal block are energized from each remote unit. Turn "**off**" switches on each unit before, opening quick disconnect switch on condensing unit. On the completion of the wiring of the Remote Condenser make sure the electrician placed the switch lever in the "**on**" position. This switch **must** be "**on**" before turning "**on**" the refrigeration toggle switch on the unit. Also, the water bath must be filled with water.*

Aeroquip Connection

1. Lubricate male half diaphragm and synthetic rubber seal with refrigerant oil.
2. Thread male coupling to its proper female half by hand to insure proper mating of threads.
3. Use proper wrenches (on coupling body hex and its union nut) and tighten union nut until coupling bodies "bottom".

Note: *You **must** use body wrench to keep body from turning while tightening nut with the second wrench. If body turns excessively, piercing seal will be damaged.*

4. Use proper wrenches to tighten an additional 1/4 turn (90°). This final 1/4 turn is necessary to insure the formation of a leak proof joint. Alternately use a torque wrench to tighten 1/2" Coupling to 40 ft lbs and 3/8" fitting to 11 ft lbs.

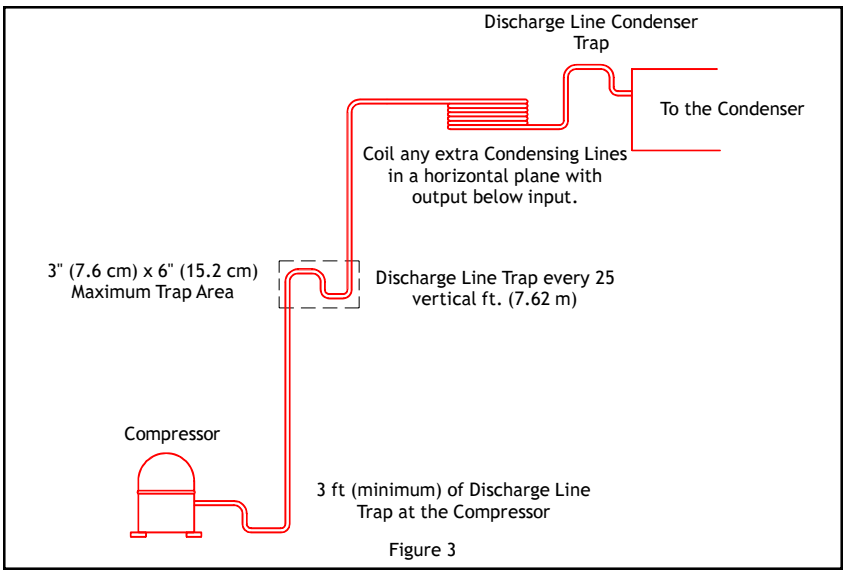

Discharge Line Condenser Trap
To the Condenser
Coil any extra Condensing Lines in a horizontal plane with output below input.
3" (7.6 cm) x 6" (15.2 cm) Maximum Trap Area
Discharge Line Trap every 25 vertical ft. (7.62 m)
Compressor
3 ft (minimum) of Discharge Line Trap at the Compressor

Figure 3

EI216524

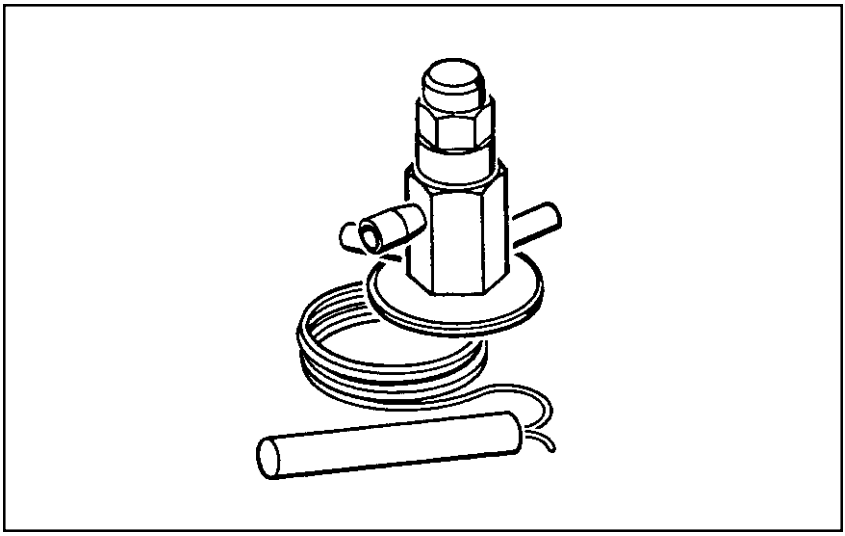
Expansion Valve or Cap Tube

Function of the expansion valve or cap tube

The expansion valve or cap tube, controls the refrigerant flow. Both controls allow the reduction of liquid refrigerant from high pressure to its evaporating pressure. The expansion valve is better suited for varying temperature conditions.

Failure of the expansion valve or cap tube

A defective expansion valve or cap tube will not properly regulate the flow of refrigerant.



Notes:

- O.E.M. part adjusted for our super heat

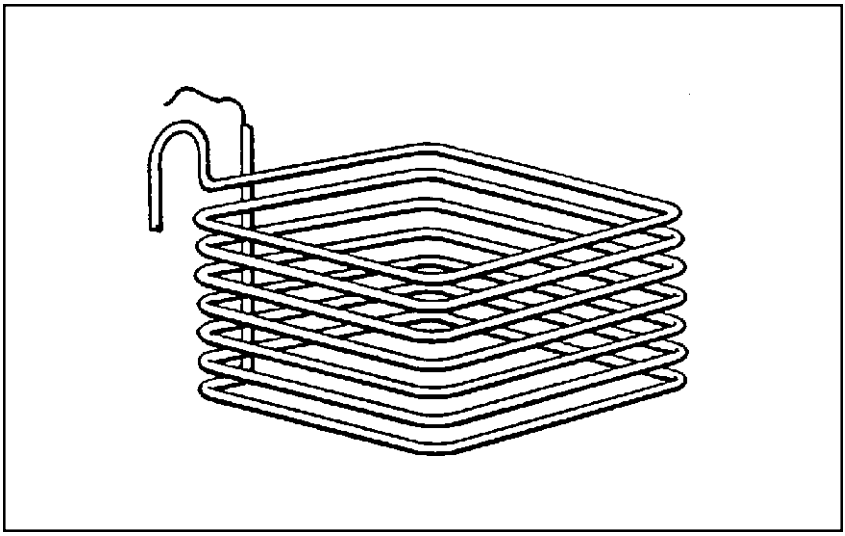
Evaporator Coil

Function of the evaporator coil

Coil in the water bath in which the refrigerant vaporizes and absorbs heat creating an ice bank.

Failure of the evaporator coil

This copper tube assembly is extremely reliable, however, concern should be given when cleaning around the evaporator to insure no sharp instruments, chemicals/cleaners are used that might damage the evaporator.



Notes:

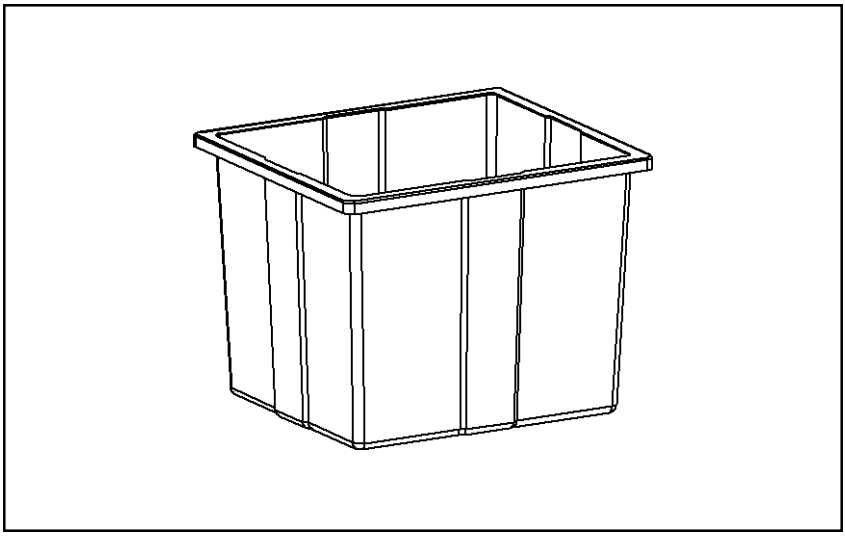
Water Bath

Function of the water bath

Water and ice reservoir, housing the carbonator tank and cooling coils. Provides an efficient method of removing heat.

Failure of the water bath

Not maintained, dirty water in the bath may cause poor ice bank formation, poor heat exchange and electrolysis.



Notes:

- Restrictions in the flow of water, in the water bath, from the agitator motor could cause an uneven ice bank (or blockage in the flow of water).

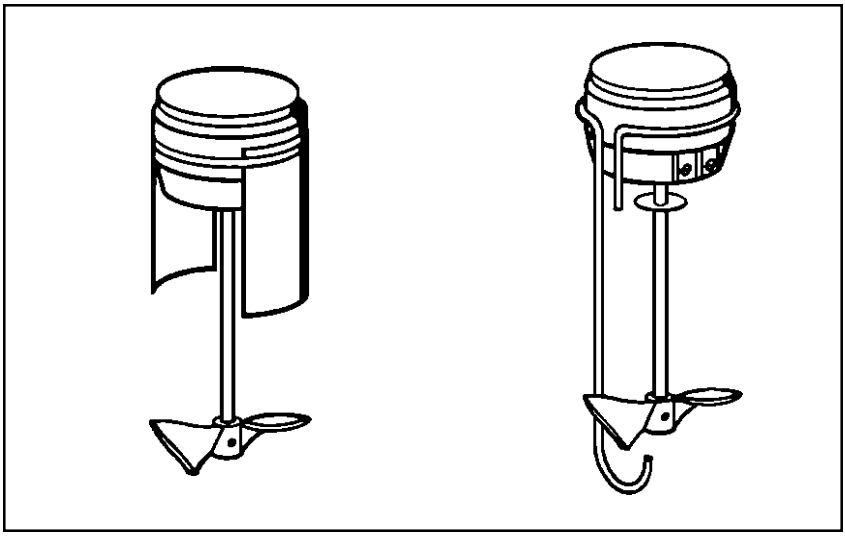
Agitator Motor

Function of the agitator motor

Agitates the water within the bath to distribute heat load and keep the ice bank uniform.

Failure of the agitator motor

An inoperative agitator will warm drinks and an irregular ice bank formation.



Notes:

- Make sure agitator motor has a heat sink (it will extend the life of your motor)
- Make sure propeller is secured to the agitator motor
- An inoperative agitator motor will cause foaming at peak times

Ice Bank Control

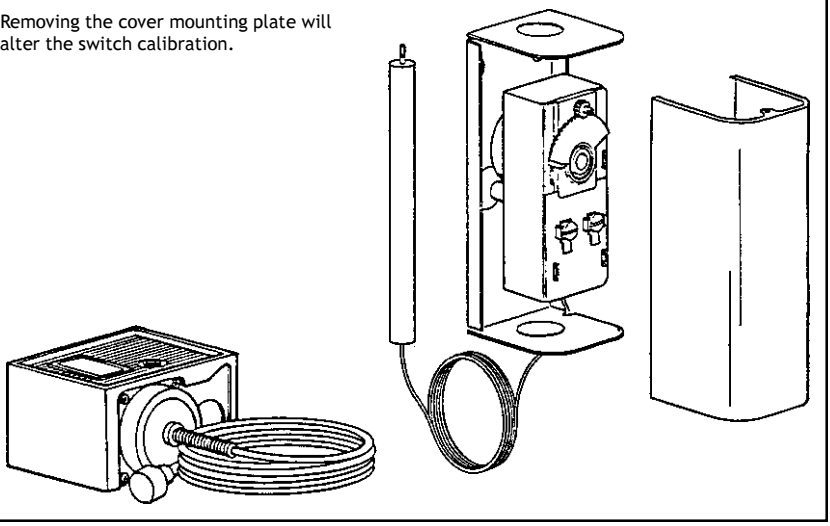
Function of the ice bank control

Pressure switch that turns on and off the refrigeration compressor when the control bulb indicates the need.

Failure of the ice bank control

Defective ice bank control stuck in the open position will not allow the refrigeration compressor to operate.
Defective ice bank control stuck in the closed position will not allow the refrigeration compressor to cut-off.

Removing the cover mounting plate will alter the switch calibration.



Notes:

- Check circuit breaker
- Check head pressure control (on remote condenser units)
- If the bulb is engulfed in ice, the compressor should not be running
- Check contactor coil for welded points
- Do not change bulb location
- If you have two controls the primary control bulb is positioned closer and lower on the evaporator coil
- A warning light will indicate when the secondary control has taken over

Head Pressure Control (used on Remote Condensing units only)

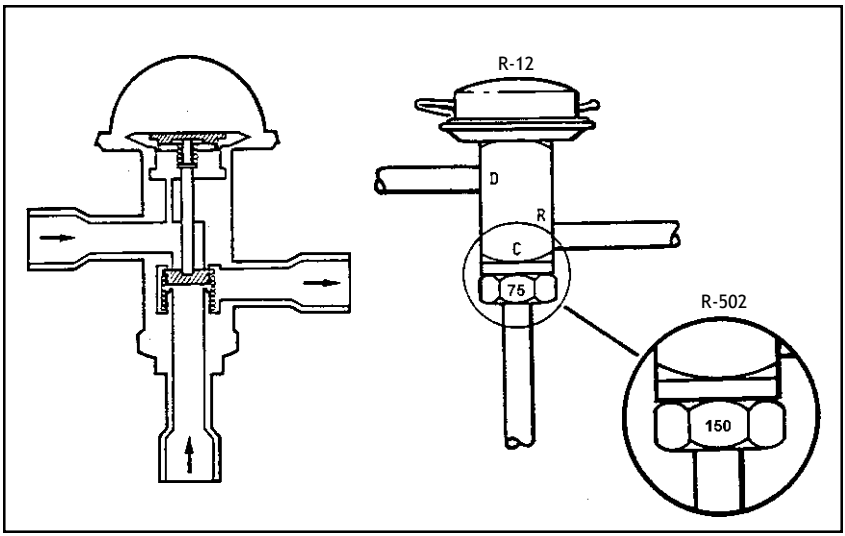
Function of the head pressure control

As the evaporator discharge pressure drops when the outside temperature drops, gas will by-pass the roof condenser and be metered into the receiver maintaining an adequate head pressure.

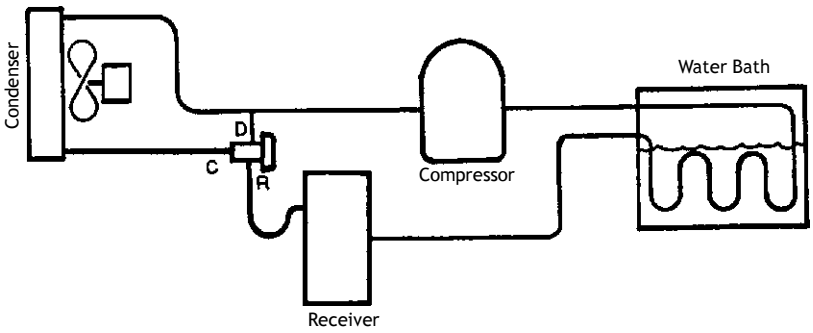
Failure of the head pressure control

A valve incapable of by-pass will effect the refrigeration unit when the outside temperature drops below 60°F with little or no ice production.

A valve stuck in by-pass will cause high head pressure and effect the ice production capabilities of the unit.



Notes:



Refrigeration Unit, Line, and Condenser Cross Reference Chart

Condenser unit

Part Number	Size	Refrigerant	Charge	Voltage	Frequency
00905222	0.75 ton	R-12	23 oz	120 VAC	60 Hz
00905224	0.75 ton	R-12	23 oz	220 VAC	50 Hz
00212551	1.5 ton	R-12	20 oz	208/230 VAC	50/60 Hz
00213365	1.5 ton	R-22	12 oz	208/230 VAC	50/60 Hz
00214150	1.5 ton	R-502	6 oz	208/230 VAC	50/60 Hz
00904685	2.0 ton	R-12	6 oz	203/230 VAC	50/60 Hz
00904812	2.0 ton	R-22	6 oz	208/230 VAC	50/60 Hz
00904811	2.0 ton	R-502	6 oz	208/230 VAC	50/60 Hz
00215500	1.5 ton	R-404A	6 oz	208/230 VAC	50/60 Hz
00904813	2.0 ton	R-134A	6 oz	208/230 VAC	
00904814	2.0 ton	R-404A	12 oz	208/230 VAC	

Refrigeration line sets

Part Number	Refrigerant	Charge (ounces)	Charge (pounds)
00204017	R-12	0.72 oz/ft	0.045 lb/ft
00213062	R-22	0.72 oz/ft	0.045 lb/ft
00209602	R-502	0.72 oz/ft	0.045 lb/ft
00215425	R-404A	0.72 oz/ft	0.045 lb/ft

Refrigeration Unit, Line, and Condenser Cross Reference Chart (continued)

Refrigeration units

Part Number	Model	Refrigerant	Charge
00903731	37KR	R-12	172 oz
00903741	37KRX	R-12	172 oz
00903758	371RX	R-12	172 oz
00903771	37TR	R-12	172 oz
00903781	37TRX	R-12	172 oz
00903791	37KR-22	R-22	151 oz
00903794	37KRX-22	R-22	151 oz
00903797	37KRX-22 V	R-22	151 oz
00904711	371R	R-12	172 oz
00904726	37MR-P	R-22	151 oz
00904736	37MRX-P	R-22	151 oz
00903804	38HR	R-12	98 oz
00903940	39SC	R-12	98 oz
00904401	44R	R-12	128 oz
00904403	44RX	R-12	98 oz
00904420	44KR	R-12	128 oz
00904423	44KRX	R-12	98 oz
00904431	44MR-G	R-22	116 oz
00904434	44MRX-G	R-22	116 oz
00904441	44KR-22	R-22	116 oz
00904444	44KRX-22	R-22	116 oz
00904464	44KRX-22 V	R-22	116 oz
00904471	44MRXG	R-134A	116 oz
00904473	44KRX	R-134A	116 oz
00904481	44MR04	R-404A	125 oz
00904491	44KR04	R-404A	125 oz
00905013	50HR	R-12	150 oz
00905016	50HRX	R-12	150 oz
00905031	50MR	R-22	140 oz
00905034	50MRX	R-22	140 oz
00905041	50MR04	R-404A	144 oz
00905044	50MRX04	R-404A	145 oz
00905046	50MR04	R-404A	144 oz
00934101	R3410R	R-502	240 oz
00936111	D3610R	R-502	240 oz
00936113	D3610R	R-404A	240 oz
00936115	3610R04C	R-404A	240 oz
00936116	3610R404C	R-404A	240 oz
00942100	D4210HR	R-22	192 oz
00948102	D4810R	R-404A	240 oz

To maintain the high quality of your Multiplex equipment we recommend you to contact your Multiplex Regional Technical Manager for the Authorized Multiplex Service Agent nearest you at **(636) 256-9797.**

High Pressure Cut-out (limiting switch)

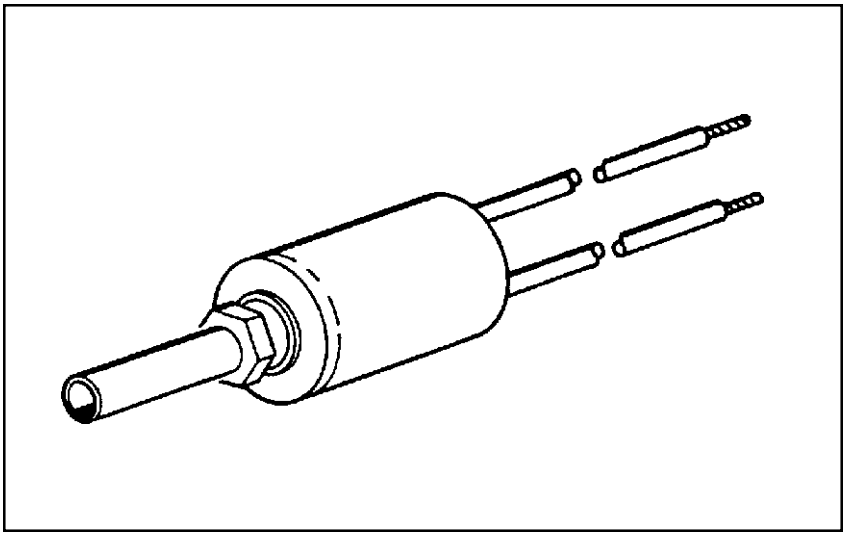
Function of the high pressure cut-out

Pressure operated control which opens electrical circuit if high-side pressure becomes too high.

Failure of the high pressure cut-out

Defective high pressure cutout stuck in the open position will not allow the refrigeration compressor to operate.

Defective high pressure cutout stuck in the closed position will not protect the refrigeration system from a high pressure situation.



Notes:

CO 250	CI 200	R-12
CO 400	CI 350	R-502

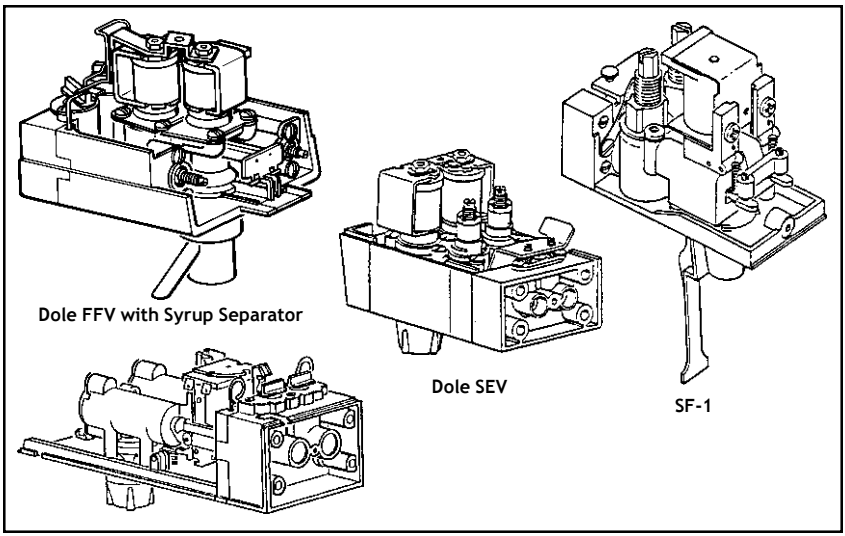
Dispensing Valves

Function of the dispensing valves

To dispense cold syrup and carbonated water, consistently at a proper ratio and speed.

Failure of the dispensing valves

Inferior finished product, poor tasting drinks.



Notes:

- Check for operation of solenoids, swollen seats, restricted valve ports and power to the dispensing valve
- Flow Rate:
  5 oz/4 sec (standard flow)
  10 oz/4 sec (fast flow)
- Set the flow rate, then adjust the ratio

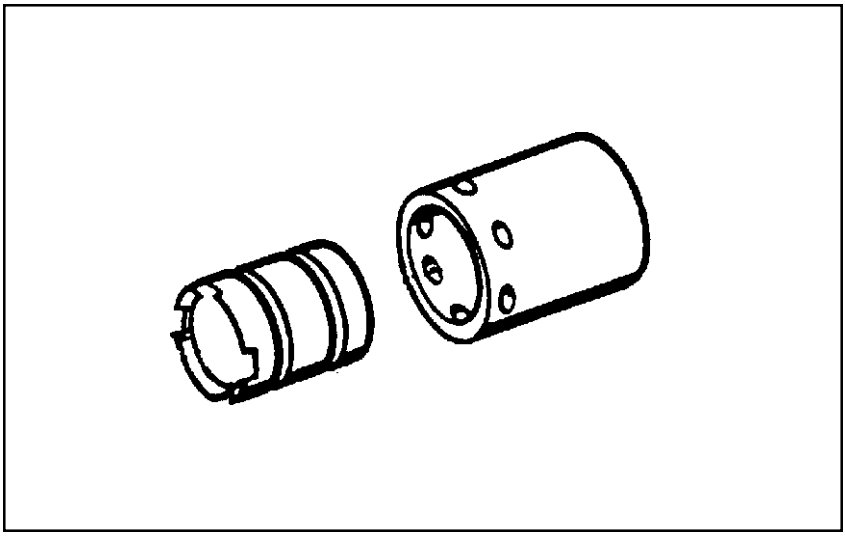
Flow Controls

Function of the flow controls

To regulate the flow of syrup or water and compensate for the drop or rise in pressures that occur when more than one dispensing valve is operated from the same supply.

Failure of the flow controls

Defective or dirty flow controls will not retain a proper and constant Brix.



Notes:

- If flow control sticks, replace
- You must not interchange spools and sleeves from different sets

Keyboards and Timers

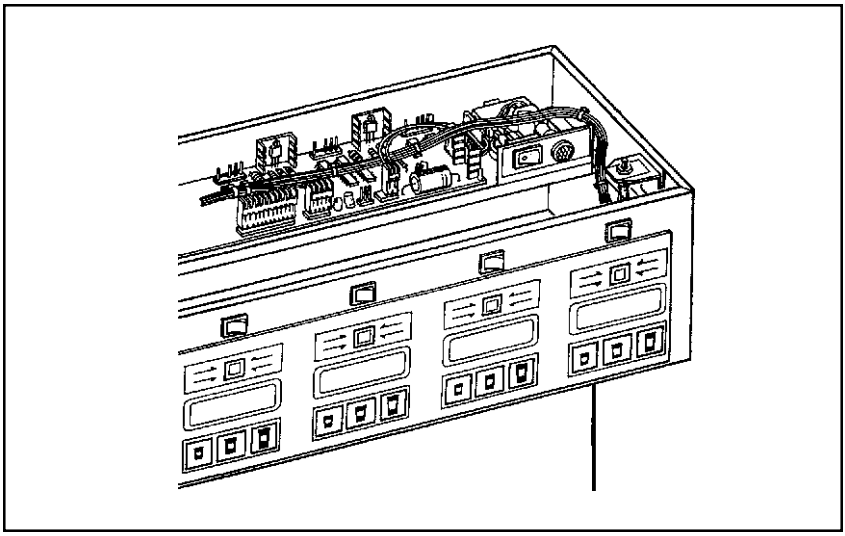
Function of the keyboards and timers

Activates the solenoid's on the dispensing valve for a specific adjustable amount of time. Generally allowing for three different time ranges.

Failure of the keyboards and timers

Defective keyboards will cause the continual activation of the timer or no activation at all.

Defective timers will cause continual dispensing of the product, no dispensing of product or will not adjust to the desired portion size.



Notes:

Multiplex Programmable Portion Control Timers

We have received some requests to publish descriptions explaining the differences between the various models of Multiplex programmable portion control timers. The following is not intended to be a step by step procedure, but is only a general overview of the unique features of each timer.

The **Model 66** was the first programmable portion control timer. It requires a 9 volt battery to retain its memory during power outages. Its 3-Size timer utilizes a separate rocker switch for calibration. To set the drink sizes:

- Turn the calibration rocker switch to the **"on"** position.
- Push the respective size pad for each keypad position at each valve.
- Repeat this process for each valve.
- Once complete, turn off the rocker switch to store the programmed sizes into memory.

The **Model 64** is similar to the Model 66, except that the 9 volt battery is no longer required, since memory is stored on a memory chip. Its 4-Size timer still requires the rocker switch for calibration.

There are major improvements with the **Model 64A Revision B**. The 4-Size timer uses a calibration button, integrated into the keypad, rather than a rocker switch. A 4 second pour feature permits easy flow rate adjustments and volume settings for all valves simultaneously from valve number 1, in an emergency. To adjust the flow rate:

- Push the **CAL** pad three (3) times in less than three (3) seconds to enter calibrate mode. Calibration light will go on.
- Push the **STOP/FILL** pad once on any valve to achieve a 4 second pour for that valve.
- Once the valve water flow adjustments are complete, push the **CAL** pad once to exit calibrate mode. Calibration light will go out.
- To adjust the Brix (water to syrup ration) for each valve, push the **CAL** pad three (3) times again.
- Push the respective size for each valve until you achieve the desired drink level in your cup.
- Exiting calibrate mode (pushing **CAL** pad once) will lock the programmed sizes to memory.

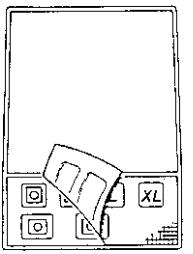
The **Model 64A Revision C** is similar to the Model 64A Revision B except that the volume settings can be completely accomplished from any valve. To adjust all valves to the same times:

- Push **CAL** pad three (3) times and push the **STOP/FILL** pad on any valve (except valve number 1) two (2) times.
- Program each size for that valve.
- Exit calibration mode by pushing **CAL** pad once. This will lock the programmed sizes for all valves into memory.

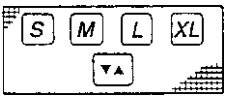
Note: *It is extremely important that all valves be adjusted to exactly the same water flow rate. If any valve is adjusted to a different flow rate (no matter how slight), it will have to be re-adjusted separately.*

What's New at Multiplex

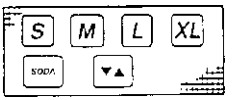
You may now order new push-button replacement labels for the 4-Size timers that are used on the Model CPss150-MD200 and Model 116 tower.



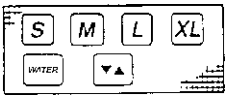
To replace, peal back worn push-button label carefully with a knife edge as shown above. Peel the covering from the back of label. Attach new label and apply light pressure to adhere the new label to the timer. Please see below for correct label to order for your timers.



P.N. 00214953
To be used with timer cover (P.N. 0021693).



P.N. 00214954
To be used with timer cover with soda button (P.N. 00216094).



P.N. 00214955
To be used with timer cover with water button (P.N. 00210695).

Instructions for Proper Dispensing Valve Calibration (Flow, Ratio, and Volume) using the 4-Size Portion Control

Flow (to set the water flow rate only)

Check that the Primary CO_2 tank high pressure regulator or bulk CO_2 regulator is adjusted properly. The Medium pressure regulator for sugar-based syrup must be adjusted to 60 psi (4 bar). The Low pressure regulator for sugar-free syrup must be adjusted to 14-16 psi (0.9-1.1 bar).

1. Turn **"off"** the syrup at the dispensing valve by turning the syrup shut-off (located on the valve mounting block). If there is no syrup shut-off, use a syrup separator.
2. Check the water shut-off (if applicable). It should be in the full open position.

Note: *The syrup and water shut-off (if equipped) are not to be used as an alternate for flow controls. They are to be used only for shutting on or off the syrup and/or the water supply.*

3. Place a volume cup with 10 oz. (295.7 mL) measurement line, under valve to be adjusted. If using syrup separator, place volume cup under water side of separator only.
4. Use 4-Size portion control timer to obtain an accurate 4 second pour as follows:
   a. Press **CAL** pad three (3) times in less than 3 seconds to enter calibrate mode. Calibrate lamp will light. (Omit this step if already in calibrate mode).
   b. Press **STOP-FILL** pad of valve to adjusted once to cause 4 second pour into volume cup.

Note: *Fast-fill valves will dispense 10 oz in 4 seconds and standard-fill valves will dispense 5 oz in 4 seconds. Diet and other products with high foaming tendencies would be adjusted to 7.6 oz and 3.8 oz respectively.*

5. To adjust the water flow rate (if necessary), turn the adjusting screw clockwise to increase and counterclockwise to decrease the flow of water.
6. Repeat 4 second dispense (**STOP-FILL** pad) and water flow adjustment, until volume is correct.
7. Open syrup shut-off or remove syrup separator (if applicable).
8. Repeat this procedure (steps 1 through 7 above) for each valve.
9. Press **CAL** button once to exit calibrate mode. Calibrate lamp will go **"off"**.

Ratio (water to syrup mixture)

1. Remove valve nozzle by turning the nozzle and pulling down.
2. Place syrup separator on valve to be adjusted. Actuate the valve manually (pad, lever) until both syrup and water flow out of the syrup/water separator.
3. Position the proper ratio cup under the syrup separator. Manually actuate the valve pad or lever valve (pad, lever). Dispense until at least $^3/_4$ of the ratio cup is filled. Both products should fill to the same level.
4. To adjust the syrup flow (if levels are not equal), turn the syrup flow control adjusting screw **clockwise to increase** and **counterclockwise to decrease** the flow of syrup.

Note: *Do not adjust the water flow during this procedure.*

5. After syrup is adjusted, remove the syrup separator and replace the valve nozzle.
6. Repeat this procedure (steps 1 through 5 above) for the remaining valves.

Volume (setting drink portion sizes)

1. To enter portion control calibrate mode, press **CAL** pad three (3) times in less than 3 seconds. Calibrate lamp will light.
2. Use volume cup with finished drink marking lines, or use correct size sample cup with desired volume of ice.
3. Press and hold respective **SIZE** pad until product gets close to proper finished drink mark, or until close to top of sample cup.
4. Release **SIZE** pad before reaching final mark or before foam exceeds final mark. Press **SIZE** pad again momentarily, as many times as is necessary (letting foam settle), to get to the correct finished drink mark.
5. Repeat steps 2 through 4 above for all sizes and all stations (products) needing calibration. Be sure to use the correct volume cup finished drink marking line, or correct sample cup size and ice amount, for each size pad.

Note: *If you fill above the final mark or need to "start over" for any reason, you must exit the calibrate mode and then re-enter the calibrate mode to resume.*

6. Exit calibrate mode by pressing **CAL** pad once. Calibrate light will go out. All changes will be permanently saved.

Instructions for Proper Dispensing Valve Calibration (Flow, Ratio, and Volume) using the 4-Size Portion Control (continued)

Special feature

For use by serviceman only, or to temporarily program all stations (products) in an emergency.

1. When you first enter calibration mode (by pressing **CAL** pad three [3] times in less than 3 seconds), any station (product) **STOP-FILL** pad can be pressed two (2) times in less than 2 seconds. The calibrate lamp will flash continuously.
2. The size pads of this station can now be calibrated as in steps 2 through 4 of **Volume** instructions. The times will replicate across all stations (products). All stations and all sizes will now have exactly the same pour times.
3. Immediately exit calibration mode by pressing the **CAL** pad once, to save changes. Calibration light will go out.

Note: *All valve flow rates and ratios must be adjusted exactly the same before attempting this "one valve adjusts all" routine.*

4. Individual stations/sizes can be re-calibrated when necessary.

Test Procedures

Model MPC64A timer/selection pad

MPC 64A Timers can be placed in the test mode as follows:

1. Flip power switch **"off"**.
2. While depressing **CAL** button on selection pad, flip power switch back on.
3. Release **CAL** button when red **LED** comes on.

Faucets will energize for 2 seconds, each in sequence, starting with faucet #1 (far left). Timer is now in the Test Mode. To stop faucets, use one of two procedures:

a. Turn power switch off. This will save the programmed times. Use this procedure for testing or sanitizing.

b. Push **CAL** button. All programmed times for all stations will go to factory default times. Default times are:

Size #1: 1 - 1.5 seconds
Size #2: 4 - 4.5 seconds
Size #3: 6 - 6.5 seconds
Size #4: 8 - 8.5 seconds

Pin identification

J-7 = Valve 1	**J-10** = Valve 4
J-8 = Valve 2	**J-11** = Valve 5
J-9 = Valve 3	**J-12** = Valve 6

Check for 24 Volts at each solenoid cable connector, **J-7** through **J-12**, with cables removed.

With cables on, check for 24 VAC across solenoids at dispensing valve while dispensing respective valve.

J-15 Power to Valves 1, 2, 3.

J-20 Power to Valves 4, 5, 6 and microprocessor.

Loss of power at **J-15** results on loss of power to valves 1, 2, 3.

Loss of power at **J-20** results on loss of power to microprocessor; no valves will work.

J-16 Station and Sizes:

#1	Stop/Fill
#2	Large
#3	Medium
#4	Small
#5	Valve 6 (or nothing, on a 5 valve tower)
#6	Valve 5
#7	Valve 4
#8	Valve 3
#9	Valve 2
#10	Valve 1
#11	Blank
#12	Extra Large

Use a jumper wire to make these connections to determine if timer is functioning properly.

1. Jump pin 1 to pin 5, 6, 7, 8, 9, 10. Appropriate valve should energize as long as pins are jumped.
2. Jump pin 12 to pin 5, 6, 7, 8, 9, 10. Valves should pour **EXTRA LARGE**.
3. Jump pin 2 to pin 5, 6, 7, 8, 9, 10. Valves should pour **LARGE**.
4. Jump pin 3 to pin 5, 6, 7, 8, 9, 10. Valves should pour **MEDIUM**.
5. Jump pin 4 to pin 5, 6, 7, 8, 9, 10. Valves should pour **SMALL**.

J-17 calibration button and light

If microprocessor does not go into calibration, remove connector at **J-17**. With jumper wire, jump 1st and 2nd pins on left 3 times in less than 3 seconds. Replace connector. Calibration light should be on (microprocessor will be in the calibration mode). White & white = calibration button. Red & black = calibration light. If CAL light does not come on, LED is burned out - replace keyboard.

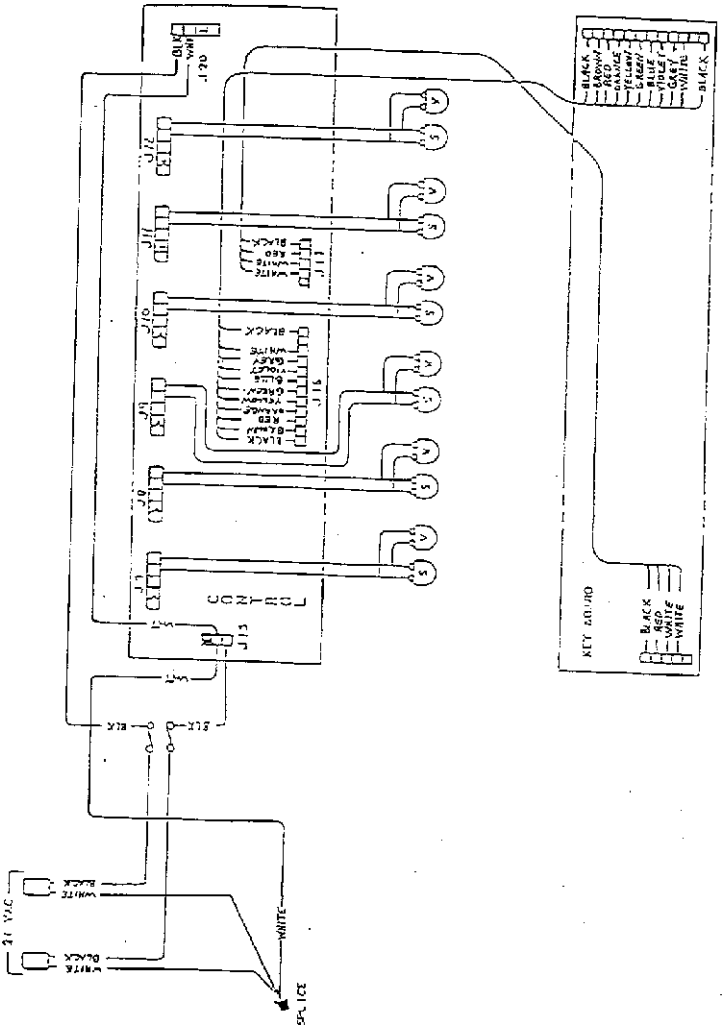
Dual Transformers

Note: *Dual Transformers must be wired in phase.**

To determine whether transformers are wired in phase: With power on, take voltage reading at HOT wire of each transformer. Reading should be **0 VOLTS***. If you read voltage, transformers are out of phase. The positions of the wires on one transformer must be switched.

* Black to White = 24 VAC +/- 10%

Black to Black = 0 VAC



Service Bulletin

MOV's field testing

Metal Oxide Varistors installed on the water and carbonated water buttons, on McDonald's style dispensing towers, are designed to completely absorb electrical spikes keeping them out of the microprocessor circuit eliminating complaints of:

- Not holding calibration
- Valves flowing by themselves
- Two valves coming on at the same time, etc.

Multiplex has designed a field test procedure that will expose a faulty MOV. This procedure will also work on the older style capacitors.

The field test procedure:

Depress separately both the water and soda water button rapidly 5-6 times. While doing this, watch all other valves. If you notice any dripping or any other valve trying to energize, the MOV's need to be replaced.

Note: *Factory installed MOV's have heat shrink tubes on each terminal leg. Always check to make sure that heat shrink has not slipped down and is insulating the MOV leg inside the terminal connector.*

Notes:

New Model MPC84A Portion Control Board

A new portion control board, the **Model MPC84A**, has been developed to improve the performance and maintain the functions and feature of the previous Model MPC64A. In addition, this Porction Control board has passed the very demanding EMC (radio frequency emissions and interference) testing for European CE approval, at the UL labs. The Model MPC64A has been phased out as of June 1996. Only the Model MPC84A will be used on new production and for service.

The new bard is the same size, has the same mounting locations, and uses the same connectors as the previous board. This article is to explain the features (which can be used to your advantage) and minor differences.

The major difference is the same size board. The Model MPC84A can control up to eight stations (dispensing valves) with up to four sizes per station. The Model MPC64A could control up to six stations.

The illustration in Figure 1 depicts the connectors on the Model MPC64A. The illustration in Figure 2 depicts the connectors on the Model MPC84A.

The power connectors J15 and J20 (24 VAC) are the same. The keyboard connectors, J16 for touchpad and J17 for calibration touchpad, are the same.

The Model MPC84A adds one more two pin keyboard connector, the J1. For an eight station tower, this connector, along with a separate two wire cable to the proper keyboard, provides the two extra stations.

The five pin valve connectors, the J7 to J12 on the Model MPC64A, are changed to a two pin connectors, the J7 to the J14 on the MPC84A. These valve connectors are not polarized (does not matter how you connect the two pins) except when the valve has a "water" or a "soda" harness.

The calibrating functions of the new portion control board are the same as the old board.

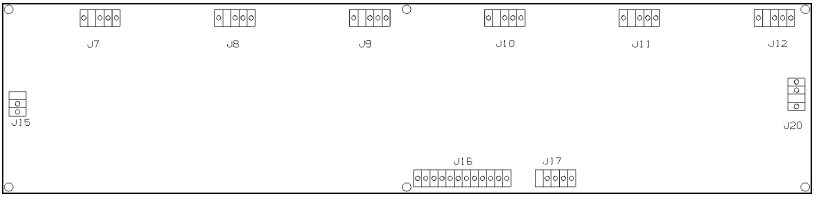


Figure 1

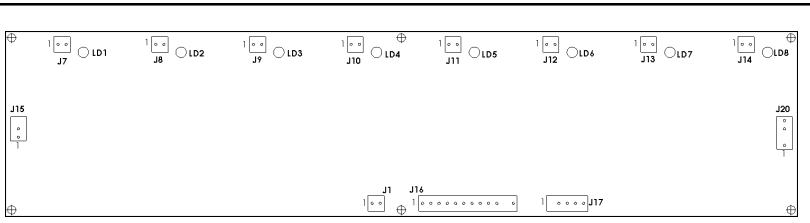


Figure 2

Instructions for Multiplex Model MPC84AT Portion Control Board with Top-off

Run Mode

Size Buttons

Press any size button (1, 2, 3, etc.) on any station to dispense product for that station for the pre-programmed time for that respective size. For example, at Station 1 press the Small size button. Station 1 should dispense the correct amount of product for a Small size.

STOP-FILL Buttons

If no dispense is in progress, press any STOP-FILL button to manually dispense from the station. Press the STOP-FILL button to manually stop and cancel any in-progress dispensing at that station.

Program Mode

Entering the Program Mode

To enter the Program Mode, press the CAL button three (3) times in less than 3 seconds. The CAL light will flash each time it is pressed. After 3 seconds, the light will remain **"on"** constantly (if pressed the proper number of times in the proper time frame).

Volume Sizing

Note: *Use a Calibration cup (or an appropriate size cup with the right amount of ice).*

1. Press the respective size button for that cup (small, medium, large, etc.) at that station.
2. Fill the cup with product to the correct level.

Note: *This same size button may be started and stopped as many times as desired to acquire the correct level while letting the drink settle. All times for same station and size are additive in the program session.*

3. Repeat volume sizing procedure for all sizes and stations.

Flow Rate Calibration

Press any STOP-FILL button one (1) time. That respective valve will flow for exactly 4 seconds allowing for checking or adjusting the valve flow rate.

One Station Sets All

After entering the Calibrate Mode, press any STOP-FILL button two (2) times in less than 1 second. The CAL light will flash constantly. Now all volumes on that station programmed in this session will copy to all other stations.

Exiting the Program Mode

To exit the Program Mode, press the CAL button one (1) time turning **"off"** the CAL light. All volume changes made during this session will permanently be stored.

Top-off program mode

Entering the Top-off Program Mode

To enter the Top-off Program Mode, press the CAL button five (5) times in less than 3 seconds. The CAL light will flash each time it is pressed and flash five (5) times after 3 seconds. The light will remain **"on"**.

Enabling and/or Disabling the individual station Top-off

Enabling the individual station Top-off allows every size dispensed on this station to pour all the volume programmed in two (2) pours with a 3 second delay between pours. Disabling the individual station Top-off allows every size dispensed on this station to pour all the volume programmed.

1. Press the STOP-FILL button on the station desired to change the top-off mode.
2. The CAL light will immediately flash five (5) times to indicate the top-off mode has been toggled. If the respective station was disabled for top-off, then it will toggle to enable for top-off. If the respective station was enabled for top-off, then it will toggle to disable for top-off.

Exiting the Top-off Program Mode

To exit the Top-off Program Mode, press the CAL button one (1) time turning **"off"** the CAL light. All station top-off mode changes made during this session will permanently be stored.

Test mode

1. With the power **"off"**, press the CAL button and turn power **"on"** simultaneously.
2. Release the CAL button. The Portion Control board will sequence each station for 4 seconds starting with the leftmost.
3. Check that each LED on the Portion Control board comes **"on"** sequentially and all valve solenoids fire.

Note: *If the LED light does not come "**on**" for any station(s), the Portion Control board is bad. If the LED light comes "**on**" but the valve does not fire, check wiring and valve solenoids.*

Sanitation mode

1. With the power **"off"**, press the CAL button and turn the power **"on"** simultaneously.
2. Release the CAL button. Each station will come **"on"** for 4 seconds sequentially. This allows automatic pouring of the sanitation fluid from each station constantly until each line drains.

Note: *If the drain can support more than one (1) valve pouring at a time, press the STOP-FILL button on the station number for the number of valves flowing simultaneously.*

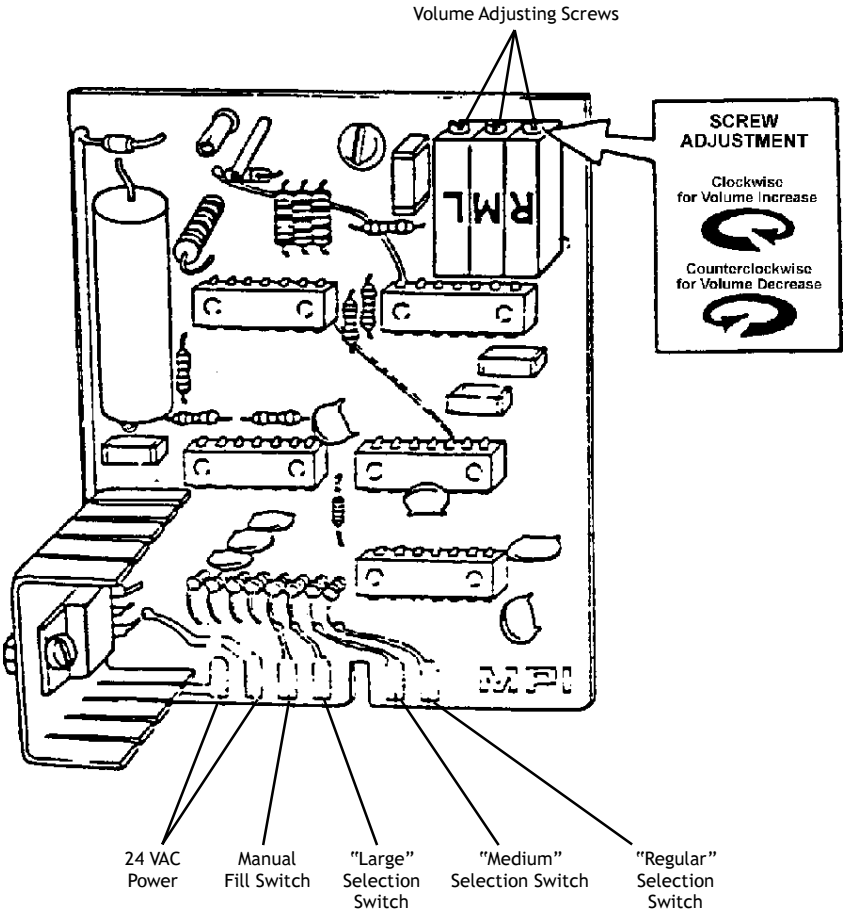
Example: *At station number 3, press the STOP-FILL button. Three (3) valves will flow simultaneously.*

McDonald's Portion Control Timer

A common problem associated with the McDonald's style portion control timer is when one size becomes non-adjustable. This may not be more than the trimming potentiometers being adjusted out of the usable range. To bring them back into range, all that must be done is to turn the screw counterclockwise 20 complete turns, and then clockwise:

Number of Complete Turns	Medium	Large	Super-Size
Fast Fill	3	4	5
Standard Fill	5	7	9

This procedure should eliminate the replacement of many "good" portion control timers.



If you have any questions or comments,
please contact Multiplex Technical Service at (314) 256-7777.

Sitco 4-Selection Portion Control Timers

Adjusting portion control for size of drinks dispensed

1. Simultaneously press and hold **"S" (SMALL)** and **"X" (EXTRA LARGE)** push button switches on Coded Autoset Portion Control Module until **LED** light in center of module starts blinking, then release switches. Blinking **LED** indicates set mode is active.
2. Put desired amount of ice in cup, place cup under valve and push selected size button (small, medium, large, or extra large). Hold button in until cup fills to desired portion then release button. Wait for foam to settle then actuate button again to top off. Repeat the above procedure for remaining sizes.
3. After programming all drink sizes, press and release **"CANCEL/POUR"** switch to return the Coded Autoset Portion Control to the operational mode. Blinking **LED** light will go out.

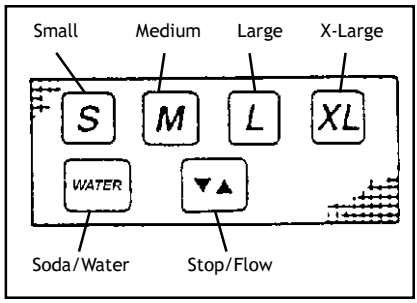
   Note: *If top-off is not desired or required, the following steps must be followed*:

   a. Follow step 1 above.

   b. Put desired amount of ice in cup, place cup under valve and push selected size button (small, medium, large, or extra large). Hold button in until cup fills to desired portion then release button.

Note: *After actuating the last selected size button, momentarily actuate one of the other size buttons. This will signal the microprocessor that all selected sizes are completed.* ***Failure to do this will signal an incomplete response back to the microprocessor*** *and the last selected size will revert back to its previous program.*

If, at a future date, it is decided to change portion size of the drinks or omit or add the top off feature, the individual sizes can be adjusted by the above procedure. It is not necessary to reprogram every size.



Cancel/pour

1. Push and release to cancel or stop valve dispensing.
2. Push and hold for continuous pour.

The portion control has a full memory retention when programming and in case of power failure.

Installation

1. Remove the front cover from the valve.
2. Remove the rear cover by loosening the screw at the front top portion of the rear cover and then lift up on the rear cover.
3. Disconnect the valve 24 volt AC electrical connection (white plug) from the dispensing valve connector.
4. Remove the entire valve wiring harness from the dispensing valve (valve lever and micro switch can be removed, if desired).
5. Attach the portion control wiring as shown in Figures 1 or 2.
6. Connect the 24 VAC connector from the portion control to the connector on the dispenser.
7. Place the rear cover on the valve and tighten the screw at the front of the rear cover.
8. Place the coded auto set portion control front cover on the front of the rear cover. Snap the front cover into the rear cover at the bottom of the front cover.

Part No.	Description
00210693	4-Selection Portion Control for Wilshire Valves
00210694	4-Selection Portion Control with Soda for Wilshire Valves
00210695	4-Selection Portion Control with Water for Wilshire Valves
00210697	4-Selection Portion Control for Lancer Valves

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In accordance with our policy of continuous product development and improvement, this information is subject to change at any time without notice.

00218011 Revision B (KAK) 31 July, 2000

Fountain Troubleshooting Guide

Fountain Beverage Dispensing Equipment

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00218012 Revision B (KAK) 7 August, 2000

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Caution: To Avoid Serious Injury

Important: *Read the following warnings before beginning an installation. Failure to do so may result in possible death or serious injury.*

DO Adhere to all National and Local Plumbing and Electrical Safety Codes.

DO Turn **"off"** incoming electrical service switches when servicing, installing, or repairing equipment.

DO Check that all flare fittings on the carbonation tank(s) are tight. This check should be performed with a wrench to ensure a quality seal.

DO Inspect pressure on Regulators before starting up equipment.

DO Protect eyes when working around refrigerants.

DO Use caution when handling metal surface edges of all equipment.

DO Handle CO_2 cylinders and gauges with care. Secure cylinders properly against abrasion.

DO Store CO_2 cylinder(s) in well ventilated areas.

DO NOT Throw or drop a CO_2 cylinder. Secure the cylinder(s) in an upright position with a chain.

DO NOT Connect the CO_2 cylinder(s) directly to the product container. Doing so will result in an explosion causing possible death or injury. Best to connect the CO_2 cylinder(s) to a regulator(s).

DO NOT Store CO_2 cylinders in temperature above 125°F (51.7°C) near furnaces, radiator or sources of heat.

DO NOT Release CO_2 gas from old cylinder.

DO NOT Touch Refrigeration lines inside units, some may exceed temperatures of 200°F (93.3°C).

Notice: *Water pipe connections and fixtures directly connected to a potable water supply shall be sized, installed and maintained in accordance with Federal, State, and Local codes.*

WARNING: DANGER OF ELECTRICAL SHOCK
Disconnect and lock out all electrical power sources before performing service or maintenance on this machine -- except when electrical tests are being performed by qualified service personnel.

Foreword

This Troubleshooting Guide has been developed to assist you in determining what the Probable Cause for any particular Problem you may experience with your Multiplex Beverage System could be. It then advises of the proper Corrective Action to be taken to remedy that Problem.

Because of the ever present danger from electrical shock, and the existence of high pressure water and gas on the system, it is strongly recommended that only qualified service personnel perform actual repairs.

To use this guide you should first recognize the Problem. Once this has been accomplished, you should refer to the Problem Cross Reference Guide, which will direct you to the troubleshooting section or sections which may be responsible for that particular Problem.

Under each of the sections, **Section 1: CO_2 Gas System, Section 2: Carbonated Water System, Section 3: Circulating System, Section 4: Compressed Air System, Section 5: Dispensing valve and tower, Section 6: Electrical System, Section 7: Refrigeration System, Section 8: Syrup System, Section 9: Water Booster System, and Section 10: Water Filter System**, you'll first find the Problem listed in bold type starting on the left margin. It will be followed by three headings also in bold type and each with its own column. The first is a Qualifier which is designed to quickly qualify or eliminate the Probable Causes listed to the right and below the qualifying statement. Example: Under **Section 7: Refrigeration System**, you'll find three Qualifiers for the same problem, "Warm drinks". Carbonated Water Temperature over 40°F (5°C)". Each asking you to determine the status of the Refrigeration Compressor and Ice Bank before proceeding to the second column Probable Causes. Not all problems have Qualifiers, but for those that do, first examine each one listed below the Problem before continuing through Probable Causes. The third heading, Corrective Action found on the right margin, will direct you in determining if the Probable Cause is actually responsible for the problem and what should be done to remedy the problem.

On occasion, you'll find "***Note***" and "***Caution***" statements which have been included to make special references to items which frequently are misunderstood or ignored.

This guide is intended to assist you in locating the cause of a problem. It is not, however, to be considered a service and repair manual in that Multiplex models vary in design.

It has been written to encompass all model Refrigeration Units. Some differences from model to model will become obvious and it will be required of the reader to apply this guide to each unit. Of main concern, is on Dual Carbonating and Circulating Systems you must consider there are two separate Carbonating and Circulating Systems.

Problem Cross Reference Guide

	CO_2	Carbonated	Circulating	Compress Air	Dispenser	Electrical	Refrigeration	Syrup	Water Booster	Water Filter
No carbonated water		X	X		X		X			
Carbon particles in drink		X	X							X
Flat drinks	X	X	R				R		X	
No or insufficient non-carbonated water					X		X		X	
Warm drinks			X							R
No or insufficient syrup				X	X		R	X		
Peculiar taste carbonated water		X								R
Peculiar taste non--carbonated water		R							X	R
Peculiar taste syrup				X				X		R
Carb and booster pump noisy		R							R	X
Air compressor operates excessively				X				R		
Loss of CO_2 gas	X							R		
Drinks too sweet					R			X		
Too much syrup					X			R		
Too much carbonated water					X					
Too much non-carbonated water					X			R		
Foaming					X		R			
Booster pump/motor won't cycle **"off"**								X		
Booster pump/motor won't cycle **"on"**								X		
Excessive Carbonation	X									
Low pressure CO_2 alarm won't cycle **"on"**	X									
Low pressure CO_2 alarm won't cycle **"off"**	X									
Water found in primary regulator	X									
Booster pump/motor won't cycle **"off"**		X								
Booster pump/motor won't cycle **"on"**		X								
Product dripping from nozzle					X					
Valves will not activate					X					
Valves will not shut **"off"**					X					
Unit totally inoperative						X				

X - Specific problem listed in section
R - Problem refer to from section with "X"

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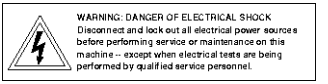
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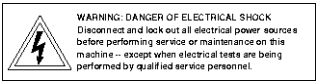
DANGER: Use extreme care during electrical circuit tests. Live circuits may be exposed.

Section 1: CO_2 Gas System

On units not equipped with Air Pump, check all ***Probable Causes*** *listed below.*

Qualifier	Probable Cause	Corrective Action
	Loss of CO_2	
If leak occurs while Change-over valve is positioned on Air, follow the "Probable Causes" (for units equipped with Air Pump).	CO_2 Tank leaking.	Use a soap solution around CO_2 Tank valve Stem to locate leaks. If leaks are present, bubbles will appear. If valve Stem leaks at Tank, replace CO_2 Tank.
	CO_2 Washer damaged or missing.	Use a soap solution around Primary Regulator Coupling Nut and CO_2 Tank Stem. If bubbles appear, remove Regulator and replace CO_2 Washer found inside Nut. Secure Regulator to Tank and check for leaks.
	Primary Regulator Diaphragm leaking.	Use a soap solution around Primary Regulator Adjustment Screw in Bonnet. If bubbles appear, diaphragm is leading. Replace Primary Regulator.
	Ruptured Line Assembly or leaks at connections.	Use a soap solution around all connections. If bubbles appear, tighten loose connections carefully.
	A to B Change-over Valve leaking.	Use a soap solution around A and B CO_2 Tank Change-over Valve, tighten if bubbles appear at Connections to stop leaks.
	CO_2 Low Pressure Switch leaking.	Use a soap solution around Low Pressure CO_2 Switch. If bubbles appear at pipe, tighten Connection. If bubbles appear at Terminal end of Switch - replace Switch.
	CO_2 Check valve leaking.	Use a soap solution around Check valve. If bubbles appear, tighten Connection to stop leaks.
	Back Flow Preventer stuck open.	Use a soap solution around Back Flow Preventer. Tighten if bubbles appear at connection. If bubbles appear at Vent Hole on underside of Back Flow Preventer, clean out or replace Back Flow Preventer valve and corresponding Water Check valve.
	Carbonator Tank Relief valve leaking.	Use a soap solution around Relief valve. If bubbles appear, replace Relief valve.
If leak occurs only while Change-over valve is positioned on CO_2, refer to Troubleshooting "Section 8: Syrup System".	Gas leak at the syrup system.	Refer to Troubleshooting "Section 8: Syrup System" under **No syrup or insufficient syrup in finished drink**.

Troubleshooting Guide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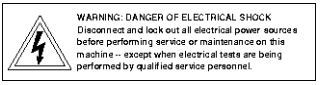
Section 1: CO_2 Gas System (continued)

Qualifier	Probable Cause	Corrective Action
Flat drinks (lack of carbonation in carbonated water)		
Primary Regulator (less than 500 psi [34.5 bar]).	CO_2 Supply exhausted (CO_2 Tank is functionally empty if pressure reads less than 500 psi [34.5 bar]).	Verify CO_2 Tank pressure is a minimum of 500 psi (34.5 bar) on the Primary Pressure Regulator Gauge marked 0-2000 psi. Replace tank if necessary.
	Primary Regulator out of adjustment or inoperative.	Verify CO_2 Primary Regulators are set at 90 psi (6.3 kg/cm^2). Adjust if necessary. If Regulator will not stay in adjustment, replace Regulator.
CO_2 Supply adequate (greater than 500 psi [34.5 bar]).	A and B CO_2 Tank Change-over Valve incorrectly positioned.	If A and B CO_2 Tank Change-over Valve is positioned on an empty Tank or halfway between A and B operating positions, CO_2 is not supplied to Carbonators. Insure valve handler is in the "operating" position.
	Malfunction of the Refrigeration System.	Refer to Troubleshooting "Section 7: Refrigeration System" under **Warm drinks**.
	Water Filter restricted.	Refer to Troubleshooting "Section 10: Water Filter System" under **Peculiar taste**.
	Malfunction of the Carbonated Water System.	Refer to Troubleshooting "Section 2: Carbonated Water System" under **Flat drinks.**
Excessive carbonation (foaming).	Primary Regulators set too high.	Verify CO_2 Primary Regulators are set at 90 psi (6.3 kg/cm^2). Adjust if necessary. If Regulator will not stay in adjustment, replace regulator. Replace.
Low Pressure CO_2 Warning light or buzzer does not come **"on"**.	Warning lamp or buzzer burned out. Transformer inoperative.	When CO_2 Tank is empty and CO_2 warning lamp(s) or buzzer fail, verify voltage across Transformer. If no voltage, replace Transformer.
	Pressure Switch defective.	If CO_2 Warning lamps or buzzer and transformer are operative. Pressure Switch is defective and must be replaced.

Troubleshooting Guide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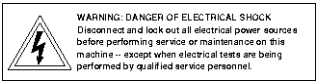
Section 1: CO_2 Gas System (continued)

Qualifier	Probable Cause	Corrective Action
Flat drinks (lack of carbonation in carbonated water) (continued)		
Low Pressure CO_2 Warning light or buzzer does not go **"off"**.	Leaks on system.	If leaks exist on CO_2 System, not enough pressure is maintained to allow Pressure Switch to cut **"off"** CO_2 Warning light or buzzer. Use a soap solution to located possible leaks. Tighten connections carefully.
	Primary Regulator out of adjustment.	Check CO_2 supply. The Primary Regulators must be set at 90 psi (6.3 kg/cm^2). Adjust if necessary. If regulator will not stay in adjustment, replace regulator.
	Pressure Switch inoperative.	Carefully disconnect one wire from the CO_2 Pressure Switch, if CO_2 Warning Lamps go out, the CO_2 Pressure Switch is defective and should be replaced. Carefully disconnect one wire from the CO_2 Pressure Switch, if CO_2 Warning Lamps go out, the CO_2 Pressure Switch is defective and should be replaced.
Water found in CO_2 Regulator and lines.	CO_2 Check Valve defective.	Turn CO_2 **"off"** at CO_2 Tank valve. Remove top Cover from Remote Refrigeration Unit. Locate CO_2 Check valve on top of Carbonator Tank. Remove CO_2 line on Inlet side of Check Valve. If CO_2 is present, escaping from Carbonator Tank, clean out or replace Check valve.

Troubleshooting Guide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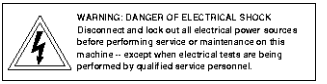
Section 2: Carbonated Water System

Qualifier	Probable Cause	Corrective Action
	Flat drinks	
Malfunctioning of Refrigeration System.	Beverages at dispensing tower are above 40°F (5°C).	Refer to Troubleshooting "Section 7: Refrigeration System" under **Warm drinks**.
Malfunctioning of Circulating System.		Refer to Troubleshooting "Section 3: Circulating System" under **Warm drinks**.
Beverages at dispensing tower are below 40°F (5°C).	CO_2 supply exhausted.	Verify CO_2 Tank pressure is a minimum of 500 psi (35 kg/cm^2) on Primary Pressure Regulator Gauge marked 0-2000 psi. Switch to full tank if necessary.
		Insure CO_2 Shut-off Valves to Carbonators are both in the **"on"** position. Refer to Troubleshooting "Section 1: CO_2 Gas System" under **Flat drinks**.
	Primary CO_2 Regulator out of adjustment or inoperative.	Verify CO_2 Primary Regulators are set at 90 psi (6.3 kg/cm^2). Adjust if necessary if Regulator will not stay in adjustment replace Regulator.
	Water Regulator incorrectly adjusted or inoperative.	Verify Filtered Water Pressure Gauge registers 55 psi (3.9 kg/cm^2), if higher than 55 psi, flooding of Carbonator will occur. To adjust, loosen Locknut, turn Adjustment Screw clockwise to increase, counterclockwise to decrease. If regulator will not respond to adjustments, replace regulator.
	Improper water treatment.	Verify By-pass handle is in the "filter operating" position. Insure Filter Cartridge is still effective, if necessary replace Cartridge. Refer to Troubleshooting "Section 10: Water Filter System."
	Carbonator Pump worn (Brass pump).	Dispense Carbonated Water while listening for carbonator pump and motor to cycle **"on"** at Refrigeration Unit. Pumps should operated between 6 to 12 seconds before cycling **"off"**. If operating time exceeds 30 seconds carbonator pump is worn, replace Pump.
	Pressure Relief Valve is leaking.	Remove top cover from Remote Refrigeration Unit. Dispense Carbonated Water until carbonator Pumps and Motor cycle **"on"**. Observe Pressure Relief Valves on carbonator Tank. If water is observed escaping from either, replace leaking Relief valve. ***Note:*** *Do not confuse the Water Bath Make-up valve for the carbonator Tank Relief valves.*

Troubleshooting Guide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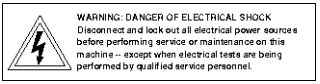
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
	Flat drinks (continued)	
Beverages at Dispensing Tower are below 40˚F (5˚C). (continued)	Back Flow Preventer.	Remove top cover from Remote Refrigeration Unit. Use a soap solution around Back Flow Preventer. If bubbles appear at Vent Hole or underside of Back Flow Preventer, clean or replace Back Flow Preventer and corresponding Water Check valve carbonator Tank.
	Double Check valve (water) stuck open.	With top cover from Remote Refrigeration Unit removed and carbonator Pump Switch and Water turned **"off"**, loosen water supply line at inlet side of Double Check valve Assembly. If CO_2 gas escapes from Check valve, it must be cleaned or replaced.

Troubleshooting Guide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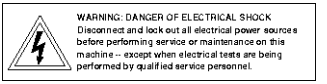
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
No carbonated water at any of the dispensing valves		
No CO_2 gas or water present at dispensing valves.	Malfunction of Refrigeration System.	Refer to Troubleshooting "Section 7: Refrigeration System" under **No carbonated water at any of the dispensing valves (freeze up).**
	Malfunction of Circulating System.	Refer to Troubleshooting "Section 3: Circulating System" under **No carbonated water at any of the dispensing valves.**
CO_2 gas is present at dispensing valves but no water.	No power to carbonator.	Verify toggle switch for Carbonator is in the **"on"** position and Main Power Supply is **"on".**
	Water supply restricted to carbonator pump.	Verify water to unit by observing Filtered Water Pressure Gauge. It should register 55 psi (3.9 kg/cm^2). To adjust, loosen Locknut, turn Adjustment Screw clockwise to increase, counterclockwise to decrease. If regulator will not respond to adjustments, replace regulator. Examine Water Shut-off Valve(s) to Carbonator and insure they are in the **"on"** position.
	Water Filter restricted.	Place Filter By-pass Valve into the Filter By-pass position. Replace Cartridge Filter. Reposition valve handle to "operating" position.
	Water Inlet strainer clogged.	Remove Filter Screen from Inlet Strainer in carbonator Pump (Brass), flush with water to clean and reassemble.
	Liquid Level Control defective.	Push Toggle Switch for carbonator and circulator to the **"off"** position. Shut **"off"** Main Power Supply unit. Remove electrical Access Panel from unit. Locate liquid level control. Using a pair of insulated needle nose pliers, carefully remove the **white** wire from the terminal marked "H" and the **black** wire from the terminal marked L on the Liquid Level Control Board. Position safely to side. Turn **"on"** Main Power Supply. Push carbonator Switch to the **"on"** position. If carbonator pump and motor do not cycle **"on"** immediately, that Liquid Level Control is defective. Replace.
	Electrode Assembly defective.	If Liquid Level Control is operating, test the Electrode Assembly, refer to Probable Cause "Liquid Level Control Defective". Verify wire leads are dry and that they are not touching. If not, replace Electrode.

Troubleshooting Guide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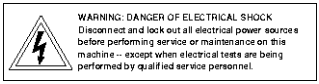
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
No carbonated water at any of the dispensing valves (continued)		
CO_2 gas is present at Dispensing Valves but no water. (continued)	Carbonator Pump worn (Brass pump).	Dispense Carbonated Water while listening for carbonator pump and motor to cycle **"on"** at Refrigeration Unit. Pumps should operate between 6 to 12 seconds before cycling **"off"**. If operating time exceeds 30 seconds, carbonator Pumps is worn, replace Pump.
	Motor defective.	If Motor will not operate, verify voltage across Motor Terminals with voltmeter. If voltage reads 110 to 120 VAC, the Motor or Pump is defective. Loosen the Coupling Clamp with a flat-blade screwdriver and disengage Pump from Motor. If Motor still will not operate with Pump disengaged, Motor is defective. Replace.
	Carbonator Pump frozen.	Loosen the Coupling Clamp with a flat-blade screwdriver and disengage Pump from Motor. By hand, turn the Coupling Key in back of Pump. If pump shaft will not spin freely, Pump is defective and must be replaced.

Troubleshooting Guide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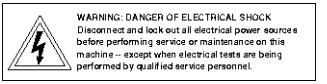
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
Carbonator pump and motor will not cycle "off" (possibly noisy pump)		
Little or no carbonated water at dispensing valve.	Primary CO_2 Regulator adjusted at extremely high pressure.	Verify CO_2 Primary Regulators are set at 90 psi (6.3 kg/cm^2). Adjust if necessary. If regulator will not star in adjustment, replace regulator.
	Water supply to Carbonator Pump shut-off or restricted.	Verify water to unit by observing Filtered Water Pressure Gauge. It should register 55 psi (3.9 kg/cm^2). Examine Water Shut-off Valves to carbonator and insure they are in the **"on"** position. Examine Pump Strainer for restriction. Clean if necessary.
	Water Filter restricted.	Place Filter By-pass valve into the "Filter By-pass" position. If carbonator pump and motor immediately cycle **"off"**, Filter Cartridge is restricted. Replace Cartridge.
	Back Flow Preventer or Double Check Valve.	Examine Filter Water Pressure Gauge. If it registers 90 psi (6.3 kg/cm^2) CO_2 gas is passing from the carbonator tank and through the Back Flow Preventer or Double Check Valve, preventing water from entering pump. Clean or replace Back Flow Preventer/Double Check Valve.
	Carbonator Pump worn.	Remove top cover from Remote Refrigeration Unit. Locate Toggle Relief Valve on Carbonator Tank and lift lever to allow CO_2 gas to escape from Tank for 30 seconds. If during this time Carbonator Pump cycles **"off"**, pump is worn and should be replaced.
	Coupling Key defective.	Loosen the Coupling Clamp with a flat-blade screwdriver and disengage Pump from Motor. Examine Coupling Key in Pump. If defective, replace.

Troubleshooting Guide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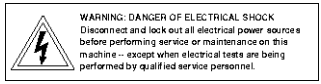
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
Carbonator pump and motor will not cycle "off" (possibly noisy pump) (continued)		
Carbonated Water at dispensing valve.	Liquid Level Control defective.	Shut **"off"** main power supply to unit and push Toggle Switch for Carbonator and Circulator to the **"off"** position. Remove Electrical Access Panel from Refrigeration Unit and locate Liquid Level Control. Strip a 1 1/2" (3.8 cm) piece of solid strand wire of insulation to use as a jumper. Turn main power supply unit **"on"** to unit. With a pair of insulated pliers, jump across Terminals marked "G, H and L" on Liquid Level Control. Simultaneously, while pushing corresponding Toggle Switch to "carbonator" to the **"on"** position. If carbonator pump and motor continue to operate after Liquid Level Control Jumper Wire is in place, Liquid Level Control is defective, replace.
	Electrode defective.	Examine wire leads to insure no breaks in connections. Remove and clean Electrode with find sand paper and reinstall. ***Note:*** *Reversing Electrode Wire Leads on either electrode or Liquid Level Control will cause erratic operation of carbonator Motor. Refer to Wiring Diagram.*
Peculiar taste in carbonated water only.	Water filter contaminated.	Refer to Troubleshooting "Section 10: Water Filter System" under **Peculiar taste**.
	Back Flow Preventer Valve leaking or Double Check Valve leaking.	Push Toggle Switch for carbonator to the **"off"** position. Turn Water Shut-off Valve to carbonator to the **"off"** position. Remove tope cover from Remote Refrigeration Unit. Carefully disconnect water line on the outlet side of the carbonator pump. If water or CO_2 is observed continually escaping from line, Back Flow Preventer/Double Check Valve is leaking. Disassemble, clean, and replace if necessary. ***Caution:*** *Carbonated water must never be allowed to flow through materials other than plastic or stainless steel. (Copper, zinc or galvanized material is non-acceptable.)*
	Carbonated water flowing through materials other than plastic or stainless.	Trace carbonated water flow through system. Insure no foreign materials are present. Replace non-acceptable material if found.

Troubleshooting Guide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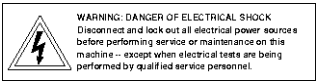
Section 2: Carbonated Water System (continued)

Qualifier	Probable Cause	Corrective Action
Carbonator pump and motor will not cycle "off" (possibly noisy pump) (continued)		
Carbon particles in furnished drink.	Malfunction of Water Filter.	Refer to Troubleshooting "Section 10: Water Filter System" under **Carbon particles in finished drinks**.
	Defective Carbonator Pump.	Remove top cover from Refrigeration Unit. Loosen Coupling Clamp with a flat-blade screwdriver and disengage pump from motor. Turn the Coupling Key by hand, in back of pump. If pump shaft does not turn freely and/or Carbon is found in pump, carbon veins are defective. Replace pump.
Carbonator Motor cycles **"on"** and **"off"** in short cycles.	Defective Circulating Pump.	Refer to Troubleshooting "Section 3: Circulating System" under **Carbon particles in finished drinks**.
	Electrode Assembly incorrectly wired or defective.	Examine wiring diagram found on Refrigeration Unit. Verify Electrode wiring leads are on proper terminals of both Electrode and Liquid Level Control. If problem still occurs, replace electrode.

Troubleshooting Guide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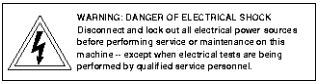
Section 3: Circulating System

Qualifier	Probable Cause	Corrective Action
	Warm drinks	
Drinks warm throughout the day, warm all the time.	Malfunction of Refrigeration System.	Refer to Troubleshooting "Section 7: Refrigeration System" under **Warm drinks (carbonated water temperature over 40°F [5°C]).**
Drinks warm during periods of low demand, much colder during periods of high demand.	No power to Circulating Motor.	Verify Switch to Circulating Motor is in the **"on"** position and Main Power Supply is **"on"**.
Carbon Particles in finished drink.	Motor defective.	Using a flat-blade screwdriver, loosen the Coupling Clamp and disengage Pump from Motor. If Motor will not operate, verify voltage across Motor Terminal with voltmeter. If voltage reads from 110 to 120 VAC, the Motor is defective and should be replaced.
	Circulating Pump defective (stainless steel).	Dispense approximately 1 gallon of carbonated water at dispensing valves. If temperature of carbonated water drops, Circulating pump is not operating. Examine Coupling Key found between Pump and Motor Shaft. If coupling key is defective, replace. If key is operational, Circulating pump is defective, replace.
No CO_2 gas or water present at dispensing valve.	Malfunction of Water Filter.	Refer to Troubleshooting "Section 10: Water Filter System" under **Carbon particles in finished drinks**.
	Malfunction of Carbonated Water System.	Refer to Troubleshooting "Section 2: Carbonated Water System" under **Carbon particles in finished drinks**.
	Circulating Pump defective (Stainless Steel).	Remove top cover from Refrigeration Unit. Loosen Coupling Clamp with a flat-blade screwdriver and disengage Pump from Motor. Turn Pump shaft with screwdriver. If Pump does not turn freely and/or carbon is found in Pump, carbon veins in pump are defective. Replace Circulating Pump.

Troubleshooting Guide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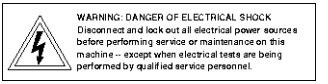
Section 3: Circulating System (continued)

Qualifier	Probable Cause	Corrective Action
	Warm drinks (continued)	
CO_2 gas is present at dispensing valves but no carbonated water.	Malfunction of Refrigeration System.	Refer to Troubleshooting "Section 7: Refrigeration System" under **No carbonated water at dispensing valve (freeze up).**
	Particles obstructing flow through Circulating Circuit (In-line Strainer).	Remove top cover from Remote Refrigeration. Push toggle switch to carbonator and circulator to the **"off"** position. Lift lever on Toggle Relief valve at top of carbonator Tank until pressure is completely released. Remove In-line Strainer Screen. Flush with clean water and reassemble.
	Malfunction of Carbonating System.	If CO_2 gas is present at the Dispensing Valves and there is no water, the problem is in the Carbonated Water System. Refer to Troubleshooting "Section 2: Carbonated Water System."

Troubleshooting Guide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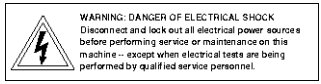
Section 4: Compressed Air System

Until repairs can be made on Compressed Air System, place Air/CO_2 Change-over Valve in the CO_2 Operating position.

Qualifier	Probable Cause	Corrective Action
	No syrup	
Air Compressor will not cycle **"on"** and Air Pressure Gauge registers 0 psi.	No power to Air Compressor.	Verify Toggle Switch to Air Compressor is in the **"on"** position and main power supply is **"on"**.
	Pressure Switch defective.	Remove Pressure Switch Cover and use a voltmeter across Switch to determine whether "open" or "closed". If in "open" position, replace switch.
	Motor defective.	Verify voltage across Motor with a voltmeter, if Motor/Pump assembly will not operate, it is defective and should be replaced.
	Pump frozen.	Same as above for Motor defective.
Air Compressor cycles **"on"** and **"off"** and Air Pressure Gauge readings range between 70 psi (4.9 kg/cm^2) to 90 psi (6.3 kg/cm^2).	Air/CO_2 Change-over Valve placed in incorrect position.	Place Air/CO_2 Change-over Valve to the Air or CO_2 "operating" position. ***Note:** If lever is positioned between Air and CO_2 the gas supply is shut "**off**" to syrup system.*
	Malfunction of Syrup System.	Refer to Troubleshooting "Section 8: Syrup System", under **No syrup**.
	Malfunction of Refrigeration System.	Refer to Troubleshooting "Section 7: Refrigeration System", under **No carbonated water at dispensing valves (freeze up)**.

Troubleshooting Guide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Section 4: Compressed Air System (continued)

Qualifier	Probable Cause	Corrective Action
	No syrup (continued)	
Air Compressor operates excessively.	Leak at Shake Machine, Orange Juice Dispenser or other optional equipment.	Turn air supply to Shake Machine to **"off"** position. If Air Compressor cuts out and maintains pressure, leak is at Shake Machine or Orange Juice Dispenser. Refer to manufacturer's manual for Troubleshooting.
	Leak at Compressed Air System.	Use a soap solution around all connections starting from the Air Motor/Pump assembly to the Low and Medium Pressure Syrup Regulators. If bubbles appear, tighten loose connections carefully.
	Automatic Drain or Petcock leaking.	Place drain line for bottom of Automatic Drain or Petcock in cup of water. If air bubbles appear, Automatic Drain or Petcock is leaking. Clean and/or replace as necessary.
	Air leak in syrup system.	Refer to Troubleshooting "Section 8: Syrup System" under **No syrup, air leak at syrup system.**
	Restricted Germicidal Filter on Air Compressor.	Replace Germicidal Filter. ***Note:** This Filter is not designed to be cleaned, but must be replaced when exhausted.*
	Water in Air Accumulator Tank.	Verify Automatic Drain is operating. If inoperative or defective, replace. If unit is not equipped with Automatic Drain use Petcock to remove water from tank.
	Motor/Pump Assembly inoperative.	If Motor/Pump assembly operate without building up to 90 psi (6.3 kg/cm^2) as needed to cycle **"off"**. Pump Assembly is defective and must be replaced.
	Pressure Switch improperly adjusted or defective.	Observe Air Pressure Gauge to insure proper cycle **"on"** at 70 psi (4.9 kg/cm^2) and cycle off at 90 psi (6.3 kg/cm^2) settings. Refer to instructions found under Switch cover for adjusting. If Switch will not respond to adjustment, replace switch.
	Check valve defective.	While Air Compressor is in the **"off"** cycle, use a soap solution around Head Gasket on Motor/Pump Assembly. If bubbles appear, replace Check valve located on the Air Accumulator Tank.

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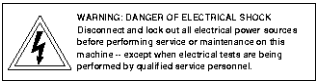
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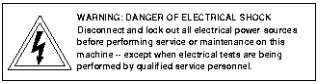
Section 4: Compressed Air System (continued)

Qualifier	Probable Cause	Corrective Action
	No syrup (continued)	
Peculiar taste in finished product.	Contaminated Germicidal Filter on Air Compressor.	Replace Germicidal Filter. ***Note:*** *This filter is not designed to be cleaned, but must be replaced when exhausted.*
	Water in Air Accumulator Tank.	Drain trapped water from tank by removing Drain Line from top of Automatic Drain. Disassemble and clean Automatic Drain. If unit is not equipped with automatic drain, use petcock to remove water from tank.
	Water Filter contaminated.	Refer to Troubleshooting "Section 10: Water Filter System" under **Peculiar taste**.

Troubleshooting Guide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Section 5: Dispensing Valve and Tower

Qualifier	Probable Cause	Corrective Action
All corresponding valves dispensing no syrup.	Malfunction of syrup system.	Refer to Troubleshooting "Section 8: Syrup System" under **No syrup or insufficient syrup in finished drink**.
No syrup at only one dispensing valve.	Syrup Shut-off Valve closed or partially closed.	Remove top cover from Dispensing valve or Tower. Locate Syrup Shut-off Valve on right hand side of Dispensing valve. Verify shut-off is turned fully open.
	Mounting Block restricted.	Remove Dispensing valve from Mounting Block. Place cup over Syrup outlet on Mounting Block and carefully open Syrup Shut-off Valve. If little or no syrup is present, Mounting Block is restricted. Remove and clean mounting block. Replace if necessary.
No syrup or insufficient syrup in finished drink		
No carbonated water at half or all dispensing valves.	Flow Control our of adjustment or inoperative.	Readjust Flow Control to proper Brix. If no response, clean Syrup Flow Control. Replace if necessary.
	Valve Port restricted.	Clean Syrup valve Port Assembly.
	Seat swollen.	Replace Syrup Seat.
	Solenoid Coil defective.	Replace Syrup Solenoid Coil.
	Malfunction of Carbonated Water System.	Refer to Troubleshooting "Section 2: Carbonated Water System" under **No carbonated water at any of the dispensing valves**.

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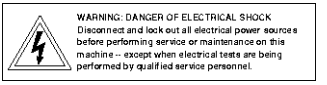
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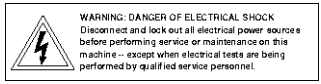
Section 5: Dispensing Valve and Tower (continued)

Qualifier	Probable Cause	Corrective Action
No carbonated water or insufficient carbonated water in finished drink		
No Carbonated Water only at one dispensing valve.	Carbonated water Shut-off Valve closed or partially closed.	Remove top cover from Dispensing valve or Tower. Locate Carbonated Water Shut-off Valve on left hand side of Dispensing valve. Verify Shut-off Valve is turned fully open.
	Mounting Block restricted.	Remove Dispensing valve from Mounting Block. Place cup over Carbonated Water outlet on Mounting Block and carefully open Carbonated Water Shut-off Valve. If little or no Carbonated Water is present, Mounting Block is restricted. Remove and clean mounting block. Replace if necessary.
	Flow Control our of adjustment or inoperative.	Readjust Flow Control to proper Brix (5 oz in 4 seconds Standard valve, 10 oz in 4 seconds Fast Flow valve). If no response, clean Carbonated Water Flow Control. Replace if necessary.
	Valve Port restricted.	Clean Carbonated Water valve Port Assembly.
	Seat swollen.	Replace Carbonated Water Seat.
	Solenoid Coil defective.	Replace Carbonated Water Solenoid Coil.
	Carbonated Water Switch defective (black).	Replaced Carbonated Water Switch.

Troubleshooting Guide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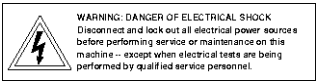
Section 5: Dispensing Valve and Tower (continued)

Qualifier	Probable Cause	Corrective Action
	No water or insufficient water in finished drinks	
All valves dispensing noncarbonated drinks no water.	Water Shut-off Valve closed or partially closed.	Refer to Troubleshooting "Section 9: Water Booster System" under **Low or No Water Pressure at Noncarbonated Beverages.**
Problem occurs at only one dispensing valve.		Refer to this section on **No carbonated water at only one dispensing valve in the dispensing valve.**
Too much Syrup, Carbonated Water or Water in finished drink. Problem occurs at only one dispensing valve.	Syrup, carbonated water, or noncarbonated water flow control out of adjustment or inoperative.	Readjust appropriate Flow Control. If Flow Control does not respond to adjustment, clean Flow Control. Replace if necessary. Carbonated Water Flow rates: (5 oz in 4 seconds Standard valve, 10 oz in 4 seconds Fast Flow valve).
Too much syrup in finished drink. All valves dispensing same flavor-too much syrup.	Malfunction of syrup system.	Refer to Troubleshooting "Section 8: Syrup System" under **Drinks too sweet.**
Too much water in finished drink. All valves dispensing noncarbonated drink too much water.	Malfunction of water Booster system.	Refer to Troubleshooting "Section 9: Water Booster System" under **Qualifier: Pump and motor cycles "on" and "off" excessively.**
Syrup or Carbonated Water or Water dripping from Nozzle.	Valve port scarred.	Disassemble appropriate Syrup or Water Assembly. Examine valve Port for scars or nicks. Replace if necessary.
	Armature Spring or Retaining Ring broken.	Disassemble appropriate Syrup or Water Assembly. Examine Armature, Spring and Retainer Ring. If damaged, replace.
	Seat scarred or obstructed.	Disassemble appropriate Syrup or Water Assembly. Examine Seat, if scarred, replace. If foreign material is found in Assembly, remove, reassemble.
Valves will not activate when Selection Panel pressed. Problem occurs at two (2) or three (3) consecutive Valves on one (1) tower.	Transformer inoperative.	Verify wire leads from Transformer have solid connections. Switch low voltage lead from Transformer supplying power to left and right hand side of Tower. If Valves operate and the other three do not, Transformer is defective. Replace.
	Dispensing tower's **"on"** and **"off"** Toggle defective.	If after switching Leads, the three valves still do not operate, the **"on"** and **"off"** Toggle Switch is defective.

Troubleshooting Guide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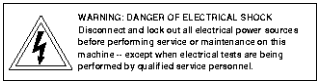
Section 5: Dispensing Valve and Tower (continued)

Qualifier	Probable Cause	Corrective Action
No water or insufficient water in finished drinks (continued)		
Problem occurs at all valves on one (1) dispensing tower.	No power to transformer or transformer defective.	Verify power with a voltmeter at wall outlet. Verify power across low voltage leads on transformer. If 24 volts are present **"on"** and **"off"** Toggle Switch is defective. Replace.
Problem occurs at only one (1) dispensing valve.	Dispensing tower's **"on"** and **"off"** is Switch defective.	Verify Main Power Supply and power at Transformer Leads replace **"on"** and **"off"** Switch if operative.
	Poor connection on valve Wire Harness.	Trace wiring on defective valve and reconnect any loose wires. Clean and reconnect any corroded connections.
	Portion Control Timer inoperative.	Replace the problem valve Portion Control Timer with a known Operative Timer. If valve then operates, Portion Control Timer was defective. Replace.
	Selection Switch inoperative.	Replace defective Portion Control Timer with operative Timer. If Valves still will not activate, Selection Panel is defective. Replace Selection Switch.
	Poor connection at Contact Clips on Selection Panel (with Portion Control Timer).	Examine Contact Clips on Selection Panel and insure proper contact between Portion Control Timer and Contact Clips.
Valve will not shut **"off"**.	Moisture on Portion Control Timer or Contact Clips.	Remove top cover from Dispensing Tower. Remove all moisture from Portion Control Timer and Contacts.
	Portion Control Timer Adjustment Screw turned beyond control limit.	Turn Portion Control Adjustment Screws on defective valve counterclockwise 10 complete turns. If valve shuts off when selection is pressed, readjust for proper portions. ***Note:*** *Several revolutions may be necessary to bring control back into range.*
	Portion Control Timer defective.	Verify above probables are not the problem. Push **"on/off"** Switch for Dispensing Tower to the **"off"** position. If valve ceases to dispense when pushed to **"on"** position, Portion Control Timer is defective. Replace.
	Selection Panel defective.	Push **"on/off"** Switch for dispensing tower to the **"off"** position. If valve ceases and then continues to dispense when switch is pushed in **"on"** position, Selection Panel is defective. Replace.

Troubleshooting Guide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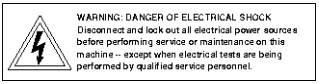
Section 5: Dispensing Valve and Tower (continued)

Qualifier	Probable Cause	Corrective Action
No water or insufficient water in finished drinks (continued)		
Foaming of finished products.	Nozzles, Syrup Tube Diffusers dirty.	Remove and clean Nozzle Assemblies and reassemble.
	Warm drinks.	Refer to Troubleshooting "Section 7: Refrigeration System" under **Warm drinks**.
	Incorrect pressure on syrup.	Verify pressure supplied to sugar base products is at 60 psi (4.2 kg/cm^2). Adjust Medium Pressure Regulator if necessary. Verify pressure supplied to diet product is at 15 psi (1.1 kg/cm^2). Adjust Low Pressure Regulator if necessary. ***Note:*** *Insure the Low Pressure Supply Line has not mistakenly been switched for a Medium Pressure Supply Line on the diet tank.*
	Change-over Valve Medium or Low Pressure is in the wrong position.	Verify valve Medium to Low Pressure is in the Low Pressure position for diet products.
	Air or CO_2 gas in syrup line.	Replace empty Syrup Tank. Dispense Syrup from valve until consistent flow is achieved and product stabilizes. If evidence of air is still entering line, replace Liquid Disconnect which is allowing air to be drawn into syrup supply.
	Flake ice.	Only cube ice should be used for carbonated beverages.
	Improper adjustment of valve.	Insure carbonated water flow is properly set (5 oz. in 4 seconds standard valve, 10 oz in 4 seconds Fast Flow valve). Insure Brix is properly set. Adjust as necessary.
Unit totally inoperative; all electrical switches in the **"on"** position.	Power failure, all power to system is **"off"**, or Fuse/ Circuit Breaker is "open".	Check Circuit Breaker. Reset. Examine Time Delay, replace if necessary.

Troubleshooting Guide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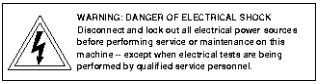
Section 6: Electrical System

Qualifier	Probable Cause	Corrective Action
Fuse/Circuit Breaker is open.	Short Circuit or overload within unit.	Push Toggle Switches labeled carbonator and circulator to the **"off"** position. Push the Toggle Switches for Booster Pump, Air Compressor, Agitator and Refrigeration to the **"off"** position. Replace fuse(s) and reset circuit breaker. Push the Toggle Switches **"on"** in the following sequence as labeled below, to locate short or overload within unit, waiting momentarily between steps. *Agitator *Refrigeration *Carbonator A and/or B *Circulator A and/or B (after carbonator Motor Cycles **"off"**) *Booster Pump *Air Compressor. Push the Agitator Toggle Switch in the **"on"** position. If the fuse/circuit breaker opens, the trouble is in the Agitator Motor Circuit. This Circuit must be checked for shorts and/or overload. If the fuse/circuit breaker does not open after running about 1 minute, the problem is not in the Agitator Motor Circuit. Push the Refrigeration Toggle Switch in the **"on"** position. If the fuses/circuit breaker opens, the trouble is in the Refrigeration Circuit. Refer to wiring diagram for possible faulty components. Push the carbonator Toggle Switch A to the **"on"** position. Draw Carbonated Water from the Dispensing valve until Pump cycles. If the fuse/circuit breaker opens, the trouble is in the carbonator Circuit. Refer to wiring diagram for possible faulty components. Push the carbonator Toggle Switch B to the **"on"** position. Follow procedure above for carbonator A. Push the Circulator Toggle Switch A to the **"on"** position. If fuse/circuit breaker opens, the trouble is in the Circulator Circuit. Refer to wiring diagram for possible faulty components. Push the Circulator Toggle Switch B to the **"on"** position. Follow procedure above for Circulator A. Push the Booster Pump Toggle Switch to the **"on"** position (allow unit to cycle). If fuse/circuit breaker opens, the trouble is in the Booster Pump Circuit. Refer to wiring diagram for possible faulty components. Push the Air Compressor Toggle Switch to the **"on"** position. (Allow unit to cycle). If fuse/circuit breaker opens, the trouble is in the Air Compressor Circuit. Refer to wiring diagram for possible faulty components. ***Important Note:*** *Worn out Circuit Breakers or low voltage are frequently responsible for shorts and overloads. Contact service agent to examine possible defective Circuit Breakers or low voltage.*

Troubleshooting Guide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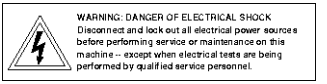
Section 7: Refrigeration System

*Until repairs can be made on unit with no Ice Bank, push Refrigeration and Agitator Switch to the "**off**" position and ice down Bath using ice from Ice Maker.*

Qualifier	Probable Cause	Corrective Action
Warm drinks (carbonated water temperature over 40˚F [5˚C])		
Compressor operates but no ice present at water bath.	Water Bath Feeder Valve inoperative (not enough water in bath).	Remove tope cover from Remote Refrigeration Unit. Verify if water level is considerably below Stand Pipe. If so, Water Make-Up valve is inoperative. Remove, disassemble and clean out valve. Replace, refill Bath and allow carbonator to cycle while inspecting valve to insure proper operation. Replace if necessary.
	Water leak inside bath.	Remove top cover from Remote Refrigeration Unit. Inspect Water Bath at Stand Pipe. If considerable water is observed running over and out the drain, there is a water leak inside Bath. The leak causes the Ice Bank to melt as fast as it's formed. Drain Bath to located the leak, repair and refill bath.
	Fan or Motor inoperative (air cooled units).	Examine Fan and Motor on Air Cooled Units at Condenser. If either are found to be inoperative while compressor is running, replace inoperative fan or motor. ***Caution**: Inoperative Fan and Motor can cause short cycling of compressor.*
Compressor operates but no ice present at water bath.	Condenser restricted.	For Air Cooled Units, clean the Condenser removing all dust and lint. On Water Cooled Units: Using a thermometer verify temperature at water discharge line. If operating outside of the 95˚F (35˚C) to 105˚F (41˚C) range, adjust Water Modulating valve, replace. ***Caution**: Restricted Condenser can cause short cycling of compressor.*
	Excessively warm room.	Verify the Refrigeration Unit is operating in a well ventilated area and that there are no obstructions blocking Condenser. If so, remove obstructions if inoperative.
	Lack of Refrigerant Charge.	Examine Sight Glass. If bubbles appear while compressor is operating system is low on charge. Refer to Serial Plate for proper refrigeration charge.
	Defective Expansion valve.	If no bubbles appear in Sight Glass then examine suction line, frost on the suction line is a sign of defective Expansion valve. Replace if inoperative.

Troubleshooting Guide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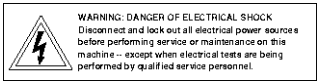
Section 7: Refrigeration System (continued)

Qualifier	Probable Cause	Corrective Action
Warm drinks (carbonated water temperature over 40˚F [5˚C]) (continued)		
Compressor operates with Ice present at water bath.	Defective Agitator Motor Assembly.	Remove top cover from Remote Refrigeration Unit. Examine the Agitator Motor Assembly, insure propeller is secured to Agitator and that the Agitator Switch is in the **"on"** position, allowing the water in Bath to be agitated across the cooling coils. If Motor or Propeller is inoperative, replace.
	Malfunctioning of Circulating System.	If ice is present on Evaporator Coil and Agitator Motor Assembly is operating the Refrigeration System is functioning. However, the Circulating System may not be functioning. Refer to Troubleshooting "Section 3: Circulating System". ***Caution:*** *Always make certain that proper line voltage is present.*
Compressor won't operate and no ice at water bath.	Defective Switch. Fuse/Circuit Breaker open.	Check to insure Refrigeration Switch is in the **"on"** position. Locate Circuit Breaker box and identify proper breaker for Remote Refrigeration Unit. Insure it is in the **"on"** position by switching **"off"** and then **"on"** again. If breaker will not reset, refer to Troubleshooting "Section 6: Electrical System."
	Time Delay Fuse burned out.	Inspect Time Delay Fuses at the wall quick shut-off panel. One of the fuses may be burned out causing half the unit to shut down. If this is suspected replace all of the fuses.
	Defective High Pressure Control.	Examine High Pressure Control to insure wire leads are securely attached to terminals. If trouble is suspected with control, replace.
	Defective Ice Bank Control.	Remove Electrical Access Panel and using a voltmeter across the Ice Bank Control, verify control is in the "closed" position. If control is found to be in the "open" position, that Control should be replaced.
	Defective Contactor.	Remove Electrical Access Panel. Use a voltmeter across Contactor Coil. If current exists across Coil, and Contactor remains "open", Contactor is defective. Replace.
	Defective Relay or Defective Capacitor or Defective Overload.	Examine Relay/Capacitor/Overload to insure wire leads are securely attached to terminals. Replace any faulty components.
	Defective compressor.	If after checking each of the above items, you still experience problems, test compressor for possible defects or grounding.

Troubleshooting Guide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Section 7: Refrigeration System (continued)

Qualifier	Probable Cause	Corrective Action
No carbonated water at any of the dispensing valves		
CO_2 gas is present at dispensing valves but no Carbonated Water.	Malfunctioning of Carbonating System.	If CO_2 gas is present at the Dispensing Valves and there is no water, the problem is in the Carbonated Water System. Refer to Troubleshooting "Section 2: Carbonated Water System."
No CO_2 Gas or water present at dispensing valve.		In a "freeze up" situation, push Refrigeration and Agitator Toggle Switches to the **"off"** position. Drain water from Bath. Pour lukewarm **(never hot)** water over the Product Coils until thawed. Ice down Water Bath using ice from Ice Maker until further repairs can be made.
	Defective Agitator.	Examine the Agitator Motor Assembly. Insure Propeller is operating and secured to Agitator and that the Agitator Toggle Switch is in the **"on"** position. If Motor is inoperative, replace.
	Defective Ice Bank Control.	Remove Electrical Access Panel. Use a voltmeter across the Ice Bank Control. Verify Control is in the "open" position. If Control is stuck in the "closed" position, the unit will "freeze up". Replace Control if necessary. If unit builds and Ice Bank to the point of extending into stainless steel coils, the Ice Bank Control must be replaced.
On units equipped with the "Red" Refrigeration Warning Light.	Defective Contactor.	Use a voltmeter across Contactor Coil. If no current is present across Coil, but Contactor remains "closed", Contactor is defective. Replace defective Contactor.
	Defective Primary Ice Bank Control.	When the Refrigeration Warning Light illuminates, the Primary Ice Bank Control is defective and should be replaced. The Secondary Control operates the Compressor until the Primary Control is replaced.
Refrigeration Warning Light cycles **"on"** and **"off"** with Compressor.		***Note:** When the Refrigeration Compressor cycles "**on**", Warning Light will turn "**off**". When the Compressor cycles "**off**" the light will illuminate.*

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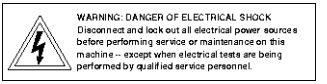
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Section 8: Syrup System

Qualifier	Probable Cause	Corrective Action
No syrup of insufficient syrup in finished drink.	Syrup Tank is empty.	Replace Syrup tank and purge air out of Dispensing Valves affected, until steady syrup supply is dispensed.
	Kinked Syrup lines.	Examine all exposed Syrup Lines and relieve any sharp bends or kinks. ***Note:*** *Observe all independent lines from Syrup Tank to Filters for kinks or bends. Correct as needed.*
	Low Pressure Regulator inoperative.	Low Pressure Regulator controls the pressure to diet beverages. Verify pressure is set at 15 psi (1.1 kg/cm^2). To increase, adjust clockwise, to decrease, adjust counterclockwise. If regulator does not respond, repair or replace regulator.
	Medium Pressure Regulator inoperative.	Medium Regulator controls the pressure applied to the sugar based beverages. Verify pressure is set at 60 psi (4.2 kg/cm^2). To increase, adjust clockwise. To decrease, adjust counterclockwise. If regulator does not respond, repair or replace regulator.
	Check Relief valve restricted.	Disengage Gas Quick Disconnect on suspected restricted flavor at Syrup Tank. Depress Poppet valve on bottom side of Gas Disconnect. If a low or poor pressure supply is apparent, replace Check Relief valve.
	Gas/Syrup Tank Plug Valves inoperative.	Replace Syrup Tank. If this solves the problem, tag defective tank so bottler can make necessary repairs. (It is extremely rare to have inoperative Tank Plug Valves.)
	Quick Disconnects (Gas or Syrup) not fully engaged on Syrup Tank.	Disengage Quick Disconnects on one Tank at a time. Rinse and clean with warm water. Lubricate the O-ring on the Syrup Tank Plug with water. Reattach the Quick Disconnects to the appropriate Syrup Tank Plug. Gas Quick Disconnects are gray or have two key slots. Syrup Quick Disconnects are black or have three key slots.
	Quick Disconnect Valves or Tank Jumper inoperative.	Gas Quick Disconnects: Open the Relief valve on the top of the syrup tank lid. If the Gas Quick Disconnect is opening properly, pressure should continue to bleed from the Gas Relief valve. If not, replace Gas Quick Disconnect. Syrup Quick Disconnects: Open the Dispensing valve (Syrup Side only) for appropriate flavor. Dispensing syrup for at least 10 seconds. If CO_2/Air pockets appear in syrup, replace Syrup Quick Disconnect. If syrup flow is inadequate or fluctuates during 10 seconds of flow, replace Syrup Quick Disconnects.

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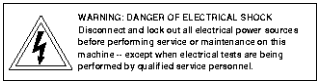
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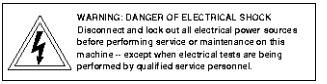
Section 8: Syrup System (continued)

Qualifier	Probable Cause	Corrective Action
No syrup of insufficient Syrup in finished drink. (continued)	Gas leak at Syrup System.	Use a soap solution around all connections, starting from the Low and Medium Pressure Regulators to the base of the Syrup Tank Plugs, observe Quick Disconnects, Tank Cap and Gasket, Tank Plugs and Syrup Tank O-rings for leaks. Repair and replace if necessary.
	Syrup Filter restricted.	Disengage Syrup Quick Disconnect from the appropriate Syrup Tank. Relieve pressure at the corresponding Dispensing valve. Remove the Screw clamp and the Filter Screen. Wash the Filter Screen with warm water and reassemble.
	Frozen Syrup Coil.	Refer to Troubleshooting "Section 7: Refrigeration System" under **No carbonated water at any of the dispensing valves (Freeze up)**.
	Dispensing valve inoperative.	Refer to Troubleshooting "Section 5: Dispensing Valve and Tower" under **No syrup or insufficient syrup**.
Drinks too sweet.	Low Pressure Regulator inoperative.	Verify Low Pressure Regulator set at 15 psi (1.1 kg/cm^2). Adjust Regulator if necessary. If Regulator will not respond, repair or replace Regulator.
	Medium Pressure Regulator inoperative.	Verify Medium Pressure Regulator set at 60 psi (4.2 kg/cm^2). Adjust Regulator if necessary. If Regulator will not respond, repair or replace Regulator.
	Dispensing valve inoperative.	Refer to Troubleshooting "Section 5: Dispensing Valve and Tower" under **Too much syrup in finished drink**.
Peculiar taste.	Contaminated Syrup.	Replace tank and sanitize the system.

Troubleshooting Guide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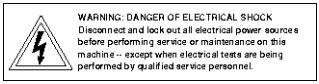
Section 9: Water Booster System

Qualifier	Probable Cause	Corrective Action
Low or no water pressure at noncarbonated beverages		
Water Booster will not cycle **"on"**. Both the pressurized filter water and filtered water pressure register 55 psi (3.8 bar).	No power to Water Booster Pump.	Verify Toggle Switch for "Booster Pump" is in the **"on"** position and main power supply is **"on"**.
	Pressure Switch defective.	Remove Pressure Switch Cover and use a voltmeter across terminals to determine whether "open" or "closed". If in the "open" position, replace Switch.
	Motor defective.	If Motor will not operate, verify voltage across Motor Terminals with a voltmeter. If voltage reads from 110 to 120 VAC, the Motor is defective and should be replaced.
	Pump frozen.	Loosen the Coupling Clamp with a flat-blade screwdriver and disengage pump from Motor. Turn the Coupling key by hand, in back of pump. If pump shaft will not spin freely, Pump is defective and must be replaced.
Water Booster cycles **"on"** and **"off"** and pressurized Filtered Water Gauged readings range between 65 psi (4.6 kg/cm^2) to 85 psi (6.0 kg/cm^2).	Water supply shut-off after Booster System.	Examine Shut-off Valve to "Plain Water to Unit" and "Water to Coffee Machine" and insure both are in the **"on"** position.
	Frozen Water Coil.	Refer to Troubleshooting "Section 7: Refrigeration System" under **No carbonated water at any of the dispensing valves (freeze up).**
Pump and Motor will not cycle **"off"**.	Water supply to Booster Pump shut **"off"**.	Examine the Shut-off Valve to Booster Pump and insure valve is in the **"on"** position.
	Restricted Water Filter.	Observe Filter Water Pressure Gauge. If pressure drops total of 40 psi (2.8 bar) or more when pump cycles **"on"**. Replace filter.
	Leak on Booster System Pump Strainer obstructed.	Locate water leaks on system and repair. Remove Pump Strainer at Brass Booster Pump, flush screen with water to clean. Reassemble and position in place. Replace screen if necessary.
	Pump Coupling Key defective.	Using a flat-blade screwdriver, loosen Coupling Clamp and disengage Pump from Motor. Examine Coupling Key, if rounded off on either end, replace.
	Pump defective.	Examine Pressurized Filter Water Pressure Gauge. If Pump and Motor continue to operate but fail to build up to 85 psi (6.0 kg/cm^2) in order to cut off, pump is defective. Replace Pump.
	Pressure Switch improperly adjusted or defective.	Observe Pressurized Filtered Water Pressure Gauge to insure proper cycle **"on"** at 65 psi (4.6 kg/cm^2) and cycle **"off"** at 85 psi (6.0 kg/cm^2). Refer to instructions found under Switch Cover for adjusting. If Switch does not respond to adjustment, replace switch.

Troubleshooting Guide


WARNING: DANGER OF ELECTRICAL SHOCK
Disconnect and lock out all electrical power sources before performing service or maintenance on this machine -- except when electrical tests are being performed by qualified service personnel.

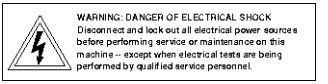
WARNING: Inspection, testing, and repair of electrical equipment should be performed only by qualified service personnel. The unit should be unplugged when servicing, except when electrical tests are required.

DANGER: Use extreme care during electrical circuit tests. Live circuits may be exposed.

Section 9: Water Booster System (continued)

Qualifier	Probable Cause	Corrective Action
Low or no water pressure at noncarbonated beverages (continued)		
Pump and Motor cycles **"on"** and **"off"** excessively.	Leak on Booster System.	Locate water leaks on system and repair.
	Check valve defective.	Observe Filtered Water Pressure Gauge. If pressure rises and drops with Pressurized Filtered Water Gauge, the Water Inlet Check valve on Pump is defective. Replace Check valve.
	Pressure Switch improperly adjusted or defective.	Observe Pressurized Filtered Water Pressure Gauge to insure proper cycle **"on"** at 65 psi (4.6 kg/cm^2) and cycle **"off"** at 85 psi (6.0 kg/cm^2). Refer to instructions found under Switch Cover for adjusting. If Switch will not respond to adjustment, replace switch.
	Accumulator Tank pressure set improperly.	Push Toggle Switch and Water Shut-off Valve to Booster Pump to the **"off"** position. Activate Plain Water button until water flow ceases. Using a tire gauge verify a 60 psi (4.2 kg/cm^2) charge on Tank. Recharge if necessary. ***Note:*** *When charging Accumulator Tank, only AIR should be used.*
	Accumulator Tank bladder ruptured.	Repeat procedures above. If water is found inside Air Chamber when verifying pressure charge, bladder is ruptured. Replace Accumulator Tank.
	Motor overheating.	Using a flat-blade screwdriver, loosen Coupling Clamp and disengage Pump from Motor. Turn Coupling Key by hand, in back of Pump. If Coupling Key is difficult to turn, it may cause defective Motor to overheat. Replace Motor if necessary.
Peculiar taste in Noncarbonated beverages.	Water Filter contaminated.	Replace Filter. Refer to Troubleshooting "Section 10: Water Filter" under **Peculiar taste**.
	Accumulator Tank bladder ruptured.	Replace Accumulator Tank. Refer to *"Pump and Motor Cycle '**on**' and '**off**' excessively"* Accumulator Tank bladder ruptured.
	Malfunction of Carbonated Water System.	Refer to Troubleshooting "Section 2: Carbonated Water System" under **Peculiar taste**, *Probable Cause: Back Flow Preventer leaking*.

Troubleshooting Guide


WARNING: DANGER OF ELECTRICAL SHOCK
Disconnect and lock out all electrical power sources before performing service or maintenance on this machine -- except when electrical tests are being performed by qualified service personnel.

WARNING: Inspection, testing, and repair of electrical equipment should be performed only by qualified service personnel. The unit should be unplugged when servicing, except when electrical tests are required.

DANGER: Use extreme care during electrical circuit tests. Live circuits may be exposed.

Section 10: Water Filter System

Until repairs can be made on the Water Filter, place valve handle into "filter By-pass" position.

Qualifier	Probable Cause	Corrective Action
Carbon particles in finished drink.	Water By-pass valve is not in the "filtering" position.	Verify By-pass valve handle is in the Filter "operating" position. If particles continue to appear, filter must be serviced.
	Defective or damaged seal on Filter Cartridge.	Verify O-rings are not twisted or nicked. Verify Cartridge is solid and free of cracks. Replace if necessary.
	Filter Cartridge installed without Inlet Seal.	Remove Cartridge from Canister. Clean Canister Lid and Shell assembly. Replace with new Filter Cartridge, making sure to remove Water Inlet Seal.
	Defective carbonator Pump.	Refer to Troubleshooting "Section 2: Carbonated Water System".
	Defective Circulating Pump.	Refer to Troubleshooting "Section 3: Circulating System".
Carbonator and Water Booster Pump extremely noisy.	Restricted Water Filter.	Observe Filter Water Pressure Gauge. If pressure drops at total of 40 psi (2.8 bar) or more when pump cycles **"on"**, replace filter.
	Filter Cartridge installed without removing Water Inlet Seal.	Removed Cartridge from Canister. Clean Canister Lid and Shell Assembly. Install new Filter Cartridge, making sure to remove Cartridge Inlet Seal.
	Water supply to Filer restricted.	Verify water supply is turned **"on"** to unit. Refer to Troubleshooting "Section 2: Carbonated Water System" and "Section 9: Water Booster System " for additional solutions.
Peculiar taste.	Water Filter contaminated.	Place Filter valve into "Filter By-pass" position. Replace Filter and reposition valve handle to "filter operating" position.

MULTIPLEX®

A Manitowoc Company

250 Old Ballwin Road • St. Louis, Missouri 63021-4800
Tel: 636.256.7777 • Fax: 636.527.4313
info@multiplex-beverage.com • www.multiplex-beverage.com

In accordance with our policy of continuous product development and improvement, this information is subject to change at any time without notice.

00218012 Revision B (KAK) 7 August, 2000

Illustrated Fittings and Hardware Catalog

Fountain Beverage Dispensing Equipment

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00218013 Revision C (KAK) 7 August, 2000

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Abbreviations

ALM	=	Aluminum	BRS	=	Brass	MPT	=	Male Pipe Thread
FF	=	Female Flare	FPT	=	Female Pipe Thread	NPT	=	National Pipe Thread
MCD	=	McDonald's	MF	=	Male Flare			
N/A	=	Not Available	NPB	=	Nickel PlatedBrass	PSI	=	Pressure Square Inch
OJ	=	Orange Juice	PLS	=	Plastic			
S/S	=	Stainless Steel	STL	=	Steel	THD	=	Thread
W	=	With	BRZ	=	Bronze	VAR	=	Variable
WO	=	Without	GEN	=	General			

Terms and Conditions Affecting Customer Purchase Orders, Shipments of Materials, and Ordering Parts

How to order

For prompt service and shipment, contact your nearest Multiplex Company Stocking Distributor. A listing of the stocking distributors can be obtained by contacting Multiplex Company, Inc. (636) 256-7777. To ensure prompt processing of your orders, list each item separately, taking care to specify quantity, the Multiplex part number and description of each item ordered. Faster service can be obtained in the future by listing your system below.

Model Number _____

Serial Number _____

Date of Installation _____

Local Authorized
Stocking Distributor _____

Terms

Terms of NET 30 days will be extended to those customers of known and acceptable financial standing. All other orders must be accompanied by check or will be shipped C.O.D. Please send all credit information directly to our controller. Taxes imposed by any present or future federal, state, or local laws, if paid by us, will be charged to purchaser. Sales or use taxes shall be in addition to prices quoted unless an appropriate Tax Exemption Certificate is furnished. Prices and terms, designs, materials, specifications, weights and dimensions for equipment or parts are subject to change without notice.

Method of shipment

All merchandise is priced F.O.B. factory. All shipments are carefully packed and labeled to prevent damage or loss. Crates, boxes and cartons used are of approved weight and strength. Orders not routed by the purchaser will be shipped at our discretion via the best method possible without any liability on our part for such selection.

Purchaser pick-up

Service parts
Orders must be received at least 24 hours prior to personal pick-up.

How to cancel an order

Multiplex will not accept the cancellation of any order for special or proprietary equipment or parts unless we receive payment of reasonable charges based on expenses already incurred and commitments made by Multiplex.

Damaged and lost shipments

The responsibility of Multiplex Co., Inc. ceases upon acceptance of the products being shipped in good condition by the carrier. Any damage or loss sustained in shipment should be reported to the delivering carrier immediately. The carrier is responsible for all shipments. If you receive a damaged shipment, ask the carrier's agent for a claim form and have the carrier prepare an inspection report, a copy of Multiplex's invoice, the freight bill, and a letter estimating the cost of repair or replacement must be submitted to the carrier before they can process your claim. Compare the number of cartons received against the number of cartons listed on our packing list or Bill of Lading. If they do not agree, be sure to note the shortage on the delivery receipt before accepting delivery and signing the delivery of the specified number of cartons. UPS shipments are insured individually and UPS will replace all merchandise that is lost. Notify us immediately if you wish to trace merchandise lost in transit.

Return of merchandise

No merchandise is to be returned without our approval. The purchaser must prepay the freight for all returned goods. After receiving our approval, all merchandise must be returned to our factory at 250 Old Ballwin Road, St. Louis, Missouri 63021. Multiplex is not responsible for merchandise returned to any location other than our factory.

The merchandise authorized to be returned must be in new, unused condition and in its original carton with all original packaging.

A credit will be allowed amounting to the original selling price or current selling price, whichever is lower, less a 15% restocking charge, with a minimum charge of $25.00 for each return to cover cost of receiving, inspection, testing, repackaging, and processing all documents.

Replacement parts purchased for out-of-warranty equipment

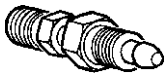
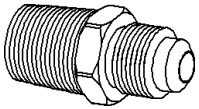
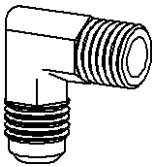
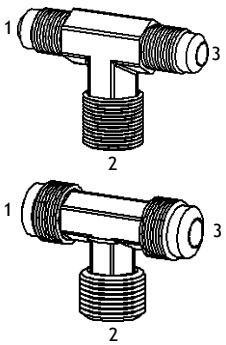
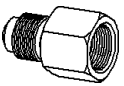
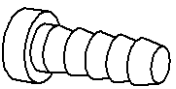
These parts will be repaired or replaced on an even exchange basis (no labor allowance) during the 90 day period following shipment from our factory.

Replacement procedure

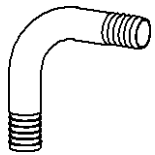
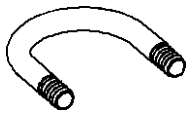
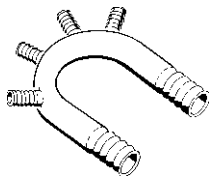
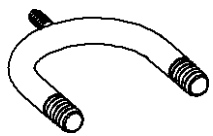
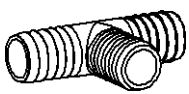
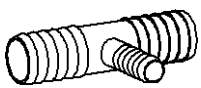
Prior approval must be received from Multiplex before a unit, motor compressor and/or components may be returned for replacement or repair. Any unit or component returned, freight collect, will be refused and returned to sender.

Multiplex will not accept any used equipment for credit. The minimum invoice charge is $25.00 per order.

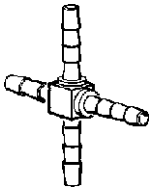
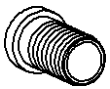
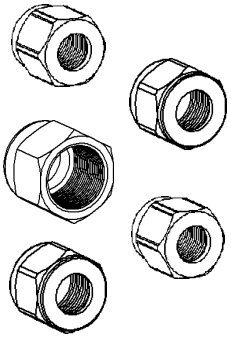
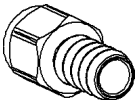
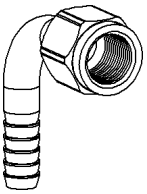
Adaptors

Item	Part No.	Size 1	Size 2	Size 3	Description
Nitrogen Adaptor (for use with Primary Regulator) 	00204859	1/4" MPT	1/2" Nitro		Brass
Male Pipe Thread x Male Flare (Straight) 	00852505	1/8" MPT	1/4" MF		Brass
	00852504	1/4" MPT	1/4" MF		Brass
	00852509	1/4" MPT	3/8" MF		Brass
	00852503	3/8" MPT	1/4" MF		Brass
	00852502	3/8" MPT	3/8" MF		Brass
	00852528	3/8" MPT	1/2" MF		Brass
	00852532	1/2" MPT	3/8" MF		Brass
	00858514	1/2" MPT	1/2" MF		Brass
	00852553	1/8" MPT	3/8" MF		Stainless Steel
	00852523	3/8" MPT	3/8" MF		Stainless Steel
Male Pipe Thread x Male Flare (Elbow - 90) 	00857600	1/4" MPT	1/4" MF		Brass
	00857604	1/4" MPT	3/8" MF		Brass
	00857603	3/8" MPT	1/4" MF		Brass
	00855902	3/8" MPT	3/8" MF		Brass
	00857608	3/8" MPT	1/2" MF		Brass
	00857609	1/2" MPT	3/8" MF		Brass
	00855925	1/2" MPT	1/2" MF		Brass
	00855926	3/8" MPT	3/8" MF		Stainless Steel
Tees 	00858432	1/8" MPT	1/4" MF	1/4" MF	Brass
	00858412	1/4" MPT	1/4" MF	1/4" MF	Brass
	00858476	1/4" MPT	3/8" MF	3/8" MF	Brass
	00858408	1/4" MF	1/4" MPT	1/4" MF	Brass
	00858435	1/4" MF	3/8" MPT	1/4" MF	Brass
	00858425	3/8" MF	3/8" MPT	3/8" MF	Brass
Female Pipe Thread x Male Flare (Straight) 	00858505	1/8" FPT	1/4" MF		Brass
	00858501	1/4" FPT	1/4" MF		Brass
	00852512	1/4" FPT	3/8" MF		Brass
	00858502	3/8" FPT	3/8" MF		Brass
Plugs - Barbed 	00861518	1/4"			Stainless Steel
	00861308	3/8"			Stainless Steel
	00861315	1/2"			Stainless Steel

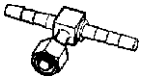
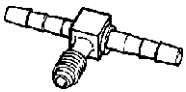
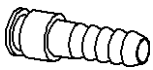
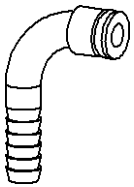
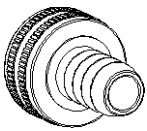
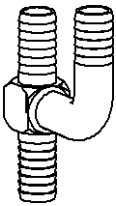
Barbed Connections

Item	Part No.	Size 1	Size 2	Size 3	Description
Splicers - Barbed	00217220	3/16"	1/2"		Stainless Steel
	00861300	1/4"	1/4"		Stainless Steel
	00861302	1/4"	3/8"		Stainless Steel
	00861317	1/4"	1/2"		Stainless Steel
	00861304	3/8"	3/8"		Stainless Steel
	00854994	3/8"	1/2"		Stainless Steel
	00861306	1/2"	1/2"		Stainless Steel
Elbows (Barbed 90)	00861400	1/4"	1/4"		Stainless Steel
	00861404	3/8"	3/8"		Stainless Steel
	00854998	3/8"	1/2"		Stainless Steel
	00854996	1/2"	1/2"		Stainless Steel
U-Bend (Barbed 180)	00858464	3/8"	3/8"		Stainless Steel
	00858469	1/2"	1/2"		Stainless Steel
U-Bend Manifold		No. Ports	Barbed		
(3/8 Supply Circuit)	00207650	1	1/4" Port		Stainless Steel
	00206294	2	1/4" Port		Stainless Steel
	00206290	3	1/4" Port		Stainless Steel
	00206280	4	1/4" Port		Stainless Steel
	00206279	5	1/4" Port		Stainless Steel
	00207753	6	1/4" Port		Stainless Steel
	00208412	7	1/4" Port		Stainless Steel
	00208413	8	1/4" Port		Stainless Steel
U-Bend Manifold	00205897	1	3/8" Port		Stainless Steel
(1/2 Supply Circuit)	00206296	2	1/4" Port		Stainless Steel
	00206292	3	1/4" Port		Stainless Steel
	00206281	4	1/4" Port		Stainless Steel
	00206278	5	1/4" Port		Stainless Steel
	00207871	6	1/4" Port		Stainless Steel
	00208414	7	1/4" Port		Stainless Steel
	00208415	8	1/4" Port		Stainless Steel
Tees - Barbed	00861500	1/4"	1/4"	1/4"	Stainless Steel
	00861502	3/8"	3/8"	3/8"	Stainless Steel
	00205440	1/2"	1/2"	1/2"	Stainless Steel
	00861506	1/4"	1/4"	3/8"	Stainless Steel
	00861504	3/8"	3/8"	1/4"	Stainless Steel
	00205898	3/8"	3/8"	1/2"	Stainless Steel
	00205681	1/2"	1/2"	1/4"	Stainless Steel
	00205903	1/2"	1/2"	3/8"	Stainless Steel

Barbed Connections (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Cross-Barbed 	00861200	1/4"	1/4"	1/4"	Stainless Steel
	00861202	3/8"	3/8"	3/8"	Stainless Steel
	00212364	1/2"	1/2"	1/2"	Stainless Steel
Stem Barbed (for use with Swivel Nut) 	00854900	1/4"	1/4" FF	Nut Item	Stainless Steel (for use with 00855000 & P.N. 00855007)
	00854908	1/4"	3/8" FF	Nut Item	Stainless Steel
	00854910	3/8"	3/8" FF	Nut Item	Stainless Steel (for use with 00855004 & P.N. 00855013)
	00854993	1/2"	1/2" FF	Nut Item	Stainless Steel (for use with P.N. 00855017)
Swivel Nut (for use with Barbed Stem) 	00855000	1/4"	1/4" Barb		Nickel Plated Brass (for use with P.N. 00854900)
	00855004	3/8"	3/8" Barb		Nickel Plated Brass (for use with P.N. 00854900)
	00855017	1/2"	1/2" Barb		Nickel Plated Brass (for use with P.N. 00854993)
	00855007	1/4"	1/4" Barb		Stainless Steel (for use with P.N. 00854900)
	00855013	3/8"	3/8" Barb		Stainless Steel (for use with P.N. 00854910)
Stem with Swivel Nut (Straight) 		Barb Stem	Swivel Nut		
	00854950	3/8"	1/4" FF		Stainless Steel
	00854910	3/8"	3/8"		Stainless Steel
	00205780	1/2"	3/8" FF		Stainless Steel
Stem with Swivel Nut (Elbows - 90) 	00854903	1/4"	1/4" FF		Stainless Steel
	00854930	1/4"	3/8" FF		Stainless Steel
	00854943	3/8"	1/4" FF		Stainless Steel
	00854927	3/8"	3/8" FF		Stainless Steel
	00208215	1/2"	3/8" FF		Stainless Steel
	00211660	1/2"	1/2" FF		Stainless Steel

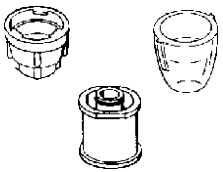
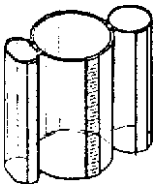
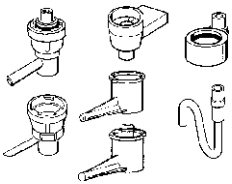
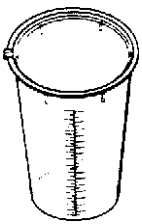
Barbed Connections (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Stem-Barbed x Male Flare (Straight)		Barbed	Male Flare		
	00861600	1/4"	1/4" MF		Stainless Steel
	00861601	1/4"	3/8" MF		Stainless Steel
	00861602	3/8"	1/4" MF		Stainless Steel
	00861603	3/8"	3/8" MF		Stainless Steel
Tee Adaptors (Swivel Tees) 		Barbed	Flare	Barbed	
	00862800	1/4"	1/4" FF	1/4"	Stainless Steel
	00862801	1/4"	3/8" FF	1/4"	Stainless Steel
	00862803	3/8"	3/8" FF	3/8"	Stainless Steel
Male Flare x Barbed Tees 	00862700	1/4"	1/4" MF	1/4"	Stainless Steel
Dispensing Valve Adaptors (Straight) (for use with Cornelius and Dole) 	00854972	1/4" Barb	3/8" "O" O-ring		Stainless Steel
Dispensing Valve Adaptors (Elbow) (for use with Cornelius and Dole) 	00854971	1/4"	3/8" "O"		Stainless Steel
Dispensing Valve Adaptors (Adapter) (for use with Cornelius and Dole) 	00213681	3/4" Garden Hose	1/2" Barb		Brass
Wye 	00218344	1/4"	1/4"	1/4" Barb	Stainless Steel
	00218345	3/8"	3/8"	3/8" Barb	Stainless Steel
	00218346	1/2"	1/2"	1/2" Barb	Stainless Steel

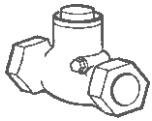
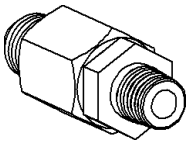
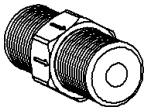
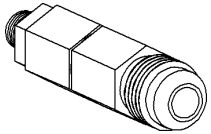
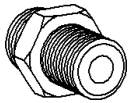
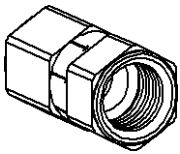
Cable Ties

Item	Part No.	Size 1	Size 2	Size 3	Description
Cable Ties	00855700	3 3/4"			Nylon
	00855701	7 1/2"			Nylon
	00855703	14"			Nylon
	00210718				Mount, Cable Tie

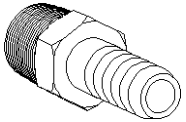
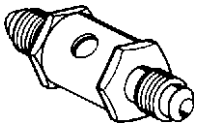
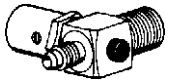
Calibrating and Cleaning

Item	Part No.	Size 1	Size 2	Size 3	Description
Backflush Nozzle 	00206133				Bar Master Hose
	00557496				Dole - SEV
	00554531				Flowmatic
	00204340				O.J. Multiplex (for Lever Activated)
Brix Cup 	00201306		3.0 to 1.0		Orange Juice
	00208971	3.5 to	6.0 to 1.0		Variable
	00687805	4.75 and	5.25 to 1.0		McDonald's
	00687802	4.75 and	5.0 to 1.0		General
	00687801	5.00 and	5.5 to 1.0		General
Syrup Separators 	00206134				Bar Master Hose
	00205840				Cornelius
	00557452				Dole - SEV
	00557499				Dole -" FFV
	00554603				Flowmatic
	00202160				Orange Juice Lever Activated
	00206629				Orange Juice Portion Control
	00212610				Lancer
Volume Cup 	00206809	Orange Juice	3/1		McDonald's
	00210316	Soda			McDonald's
	00205163	Soda			General

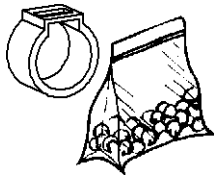
Check Valves

Item	Part No.	Size 1	Size 2	Size 3	Description
Swing 	00701325	1/2" FPT	1/2" FPT		Brass
Single		Out	In	Orifice	
(Male Pipe Thread x Male Flare)	00701312	1/8" MPT	1/4" MF	0.187	Stainless Steel
	00204864	1/8" MPT	3/8" MF	0.125	Stainless Steel
Single		Out	In		
(Male Pipe Thread x Male Pipe	00201702	1/4" MPT	1/4" MPT		Brass
Thread)	00701322	3/8" MPT	3/8" MPT		Brass
	00209527	3/8" MPT	3/8" MPT		Brass (for O.J.)
Double		Out	In	Orifice	
(Male Pipe Thread x Male Flare)	00701314	1/8" MPT	1/4" MF	0.14	Stainless Steel
	00701313	1/8" MPT	1/4" MF	0.09	Stainless Steel
	00701330	1/8" MPT	1/4" MF	0.125	Stainless Steel
	00209179	1/8" MPT	1/4" MF	0.125	Stainless Steel (with atomizer)
	00208126	1/8" MPT	1/4" MF	0.09	Stainless Steel (with atomizer)
In-Line		Out	In		
(Male Pipe Thread x Male Flare)	00862204	1/8" MPT	1/4" MF		Brass
	00701304	1/4" MF	1/4" MPT		Brass
					
In-Line		Out	In		
(Male Flare x Female Flare)	00862202	1/4" MF	1/4" FF		Brass
In-Line		Out	In		
(Female Pipe x Female Pipe)	00203901	1/4" FPT	1/4" FPT		Brass
	00204817	1/2" FPT	1/2" FPT		Brass
					

Check Valves (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Male Pipe Thread x Barb		Out	In		
	00206974	1/8" MPT	1/4" Barb		Brass
Vent to Atmosphere		Out	In		
(Backflow Preventer)	00204852	3/8" MF	3/8" MPT		Stainless Steel
	00701324	3/8" MF	3/8" MF		Stainless Steel
	00701333	1/4" FF	1/4" MF		Stainless Steel
	00205561	3/8" FF	3/8" MF		Stainless Steel
	00210890	1/8" MPT	3/8" MF		Stainless Steel
	00686978	1/4" MPT	3/4" MPT		Brass
Relief/Check Assembly	00201102	1/4" MF	1/4" MPT		Brass
					

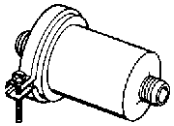
Clamps

Item	Part No.	Size 1	Size 2	Size 3	Description
Adjustable		Range/Inch	Each	Package	
	00859116	.218-.625			Stainless Steel
	00859118	.500-.906	(N/A)		Stainless Steel
	00859112	.812-1.50	(N/A)		Stainless Steel
Tab - One Ear		Range/Inch	Chudnow	Oetiker	Each
	00855108	.275-.342	0.348	8.7	Stainless Steel
	00855114	.350-.413	0.505	10.5	Stainless Steel
	00208720	.378-.444	0.425	11.3	Stainless Steel
	00855110	.398-.464		11.8	Stainless Steel
	00855115	.385-.484	0.470	12.3	Stainless Steel
	00855109	.425-.523	0.505	13.3	Stainless Steel
	00855116	.445-.543	0.525	13.8	Stainless Steel
	00855127	.443-.551	0.545	14	Stainless Steel
	00855119	.519-.618	0.590	15.7	Stainless Steel
	00855112	.570-.669	0.635	17	Stainless Steel
	00855128	.653-.779	0.745	19.8	Stainless Steel
	00855133	.700-.826	210	21	Stainless Steel
	00855117	.822-.948	0.925	24.1	Stainless Steel
	00855122	1.55-1.67	4043	42.5	Steel

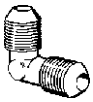
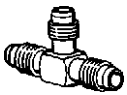
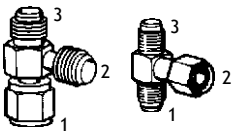
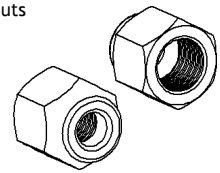
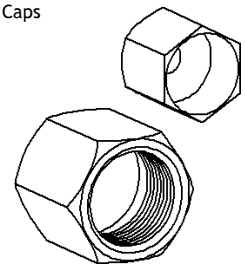
Disconnects

Item	Part No.	Size 1	Size 2	Size 3	Description
	00207506	Gas	1/4" Barb		Coke
	00207505	Liquid	1/4" Barb		Coke
	00565206	Gas	1/4" MF		Coke
	00565207	Liquid	1/4" MF		Coke
	00206670	Gas	1/4" Barb		General
	00206639	Liquid	1/4" Barb		General
	00565208	Gas	1/4" MF		General
	00565209	Liquid	1/4" MF		General
	00210789	Jumper Assembly,	15"		Coca-Cola
	00210790	Jumper Assembly,	15"		General

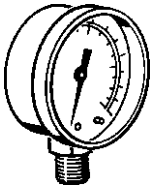
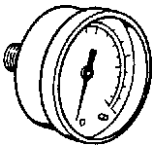
Syrup Filter

Item	Part No.	Size 1	Size 2	Size 3	Description
	00203161	3/8" MF	3/8" MF		Plastic
	00858115	1/4" MF	3/8" MF		Adapter (to connect to 1/4" line, order 2)

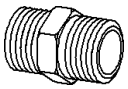
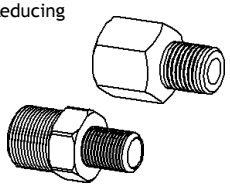
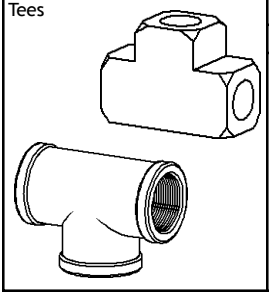
Flare Connections

Item	Part No.	Size 1	Size 2	Size 3	Description
Unions	00857904	1/4" MF	1/4" MF		Stainless Steel
	00857907	1/4" MF	3/8" MF		Stainless Steel
	00857908	3/8" MF	3/8" MF		Stainless Steel
Reducing	00858115	3/8" FF	1/4" MF		Stainless Steel
Elbows 	00861704		3/8" MF	3/8" MF	Brass
Tees (Male Flare) 	00858405	1/4" MF	1/4" MF	1/4" MF	Stainless Steel
Tees (Swivel) 	00858477	1/4" FF	1/4" MF	1/4" MF	Stainless Steel
	00205783	3/8" FF	3/8" MF	3/8" MF	Stainless Steel
	00858410	3/8" MF	3/8" FF	3/8" MF	Stainless Steel
Gaskets	00852900	1/4"			Plastic
	00852902	3/8"			Plastic
	00851803	1/2"			Plastic
Nuts 	00856502	1/4"			Brass
	00856501	3/8"			Brass
	00856516	3/8"	Long		Brass
	00856500	1/2"			Brass
	00856508	1/2"	Long		Brass
	00856528	3/8"			Nickel Plated Brass
Caps 	00854402	1/4" FF			Brass
	00854412	3/8" FF			Brass
	00213166	1/2" FF			Brass
	00854409	1/4" FF			Stainless Steel
	00854411	3/8" FF			Stainless Steel

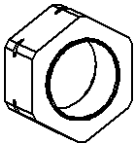
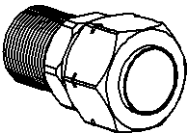
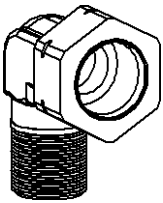
Gauges

Item	Part No.	Size 1	Size 2	Size 3	Description
Bottom Mount 		Range-psi	Pipe Size		
	00683123	0-30	1/8" MPT		
	00683116	0-30	1/4" MPT		
	00683124	0-100	1/8" MPT		
	00683072	0-100	1/4" MPT		
	00206401	0-120	1/8" MPT		
	00211907	0-150	1/4" MPT		with follower
	00683111	0-160	1/4" MPT		
	00683107	0-2000	1/4" MPT		
Back Mount 	00205644	0-60	1/8" MPT		
	00683108	0-100	1/8" MPT		
	00684844	0-160	1/4" MPT		

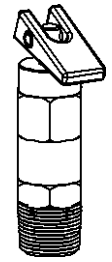
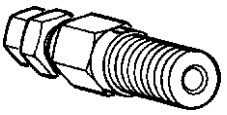
Pipe Connections

Item	Part No.	Size 1	Size 2	Size 3	Description
Bushings	00853929	1/8" FPT	1/4" MPT		Brass
	00853909	1/4" FPT	3/8" MPT		Brass
	00853953	1/4" FPT	1/2" MPT		Brass
	00853947	3/8" FPT	1/2" MPT		Brass
	00853905	3/8" FPT	3/4" MPT		Brass
	00853906	1/2" FPT	3/4" MPT		Brass
Nipples 	00700717	1/8" MPT	15/16" LG		Brass
	00700706	1/4" MPT	1 3/8" LG		Brass
	00700720	3/8" MPT	1 3/8" LG		Brass
	00700705	1/2" MPT	1 1/2" LG		Brass
Reducing 	00858507	1/8" MPT	1/4" FPT		Brass
	00700716	1/8" MPT	1/4" MPT		Brass
	00858107	1/4" MPT	3/8" MPT		Brass
	00700723	3/8" MPT	1/2" MPT		Brass
Tees 	00858406	1/4" FPT	1/4" FPT	1/4" FPT	Brass
	00858401	3/8" FPT	3/8" FPT	3/8" FPT	Brass
	00858467	1/2" FPT	1/2" FPT	1/2" FPT	Brass

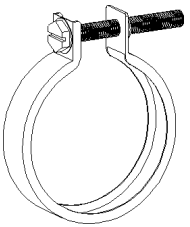
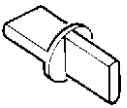
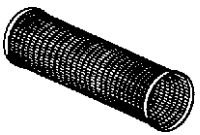
Compression Fittings

Item	Part No.	Size 1	Size 2	Size 3	Description
Compression Nut with Captive Sleeve 	00205754	3/4" OD			Brass
	00206092	1/2" OD			Brass
	00206093	3/8" OD			Brass
	00213421	1/4" OD			Brass
Adapter, Straight 	00206079	3/4" OD	3/4" MPT		Brass
	00206078	3/4" OD	1/2" MPT		Brass
	00204749	1/2" OD	1/2" MPT		Brass
	00205683	1/2" OD	3/8" MPT		Brass
	00209511	1/2" OD	1/4" MPT		Brass
	00210481	1/2" OD	1/4" MPT		Brass
	00204765	3/8" OD	3/8" MPT		Brass
	00204748	3/8" OD	1/4" MPT		Brass
	00205076	3/8" OD	1/8" MPT		Brass
	00209405	1/4" OD	1/2" MPT		Brass
	00209406	1/4" OD	1/4" MPT		Brass
Adaptor, Elbow 	00206083	3/4" OD	1/2" MPT		Brass
	00209410	1/2" OD	1/2" MPT		Brass
	00209970	1/2" OD	3/8" MPT		Brass
	00204751	1/2" OD	1/4" MPT		Brass
	00204782	3/8" OD	3/8" MPT		Brass
	00209408	1/4" OD	3/8" MPT		Brass
	00209404	1/4" OD	1/4" MPT		Brass
	00209407	1/4" OD	1/4" MPT		Brass
Tubing	PE051254	3/4" OD	1/2" ID		Poly
	RM151315	1/2" OD	3/8" ID		Poly
	RM151314	3/8" OD	1/4" ID		Poly
	RM151129	1/4" OD	5/32" ID		Nylon

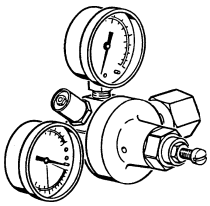
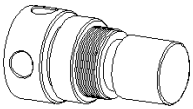
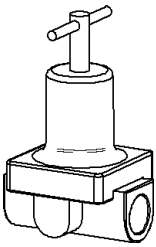
Pressure Reliefs

Item	Part No.	Size 1	Size 2	Size 3	Description
Toggle Relief Valve 	00701332	100	1/8" MPT	Orange	Brass
	00200250	100	1/4" MPT	Orange	Brass
	00565307	130	1/8" MPT	Gray	Stainless Steel
	00701338	130	1/8" MPT	Blue	Brass
	00701336	130	1/4" MPT	Blue	Brass
	00701334	150	1/8" MPT	Yellow	Stainless Steel
	00701311	180	1/8" MPT	Red	Stainless Steel
Water Feeder	00205241	105	1/4" MPT		Brass
	00217305	1/4" FTP			Must use John GuestTee P.N. 00211796
	00204920	105			Brass, Complete Add-on Kit
Air Pump Reliefs 	00682451	ITT			Brass
	00204028	GAST			Brass

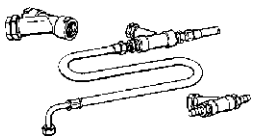
Pump Accessories

Item	Part No.	Size 1	Size 2	Size 3	Description
Clamp 	00705000				Stainless Steel
Coupling Key 	00702907				Bronze
Strainer Screen 	00702925				Stainless Steel

Regulators

Item	Part No.	Size 1	Size 2	Size 3	Description
Primary CO_2 Regulator 	00204814				Primary CO_2 Regulator
	00683128				Primary CO_2 Regulator
	00217392				Guard, Primary CO_2 Regulator
Secondary Air/CO_2		Range-psi	Pipe Size	Application	
Regulator (less Gauges) 	00683118	0-30	1/4" NPT	Diet	General Line (Low)
	00683058	0-100	1/4" NPT	Sugar	General Line (Med)
	00204553	0-100	1/4" NPT	Sugar/OJ	McDonald's Units and OJ (Med)
Water 		Range-psi	Pipe Size	Application	
	00205642	0-30	1/8" NPT	Steamer	Less Gauges 3" Port
	00209162	0-100	1/4" FPT	OJ	Less Gauges 3" Port
	00686903	10-50	1/4" NPT	N/A	Less Gauges 3" Port
	00683117	10-70	1/2" NPT	Water	No Gauge Port
	00683129	25-75	3/4" NPT	55 psi	No Gauge Port

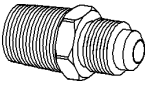
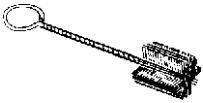
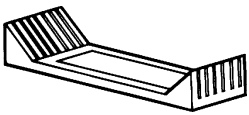
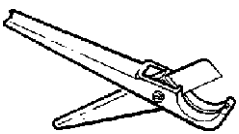
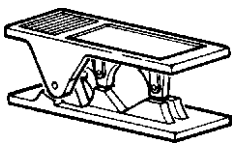
Strainers

Item	Part No.	Size 1	Size 2	Size 3	Description
	00205829	3/8" FPT	3/8" FPT		Plastic
	00207633	3/8" Barb	3/8" Barb		Plastic
	00206982	3/8" FF	3/8" MF		Plastic

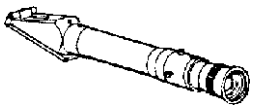
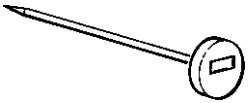
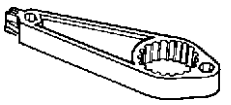
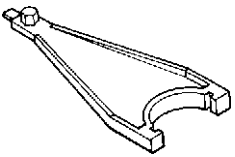
Insulation

Item	Part No.	Size 1	Size 2	Size 3	Description
	00211684	2" x 30'			Aluminum
	00689700	2" x 30'			Cloth
	RM051120	2" x 1'			Cork
	00689701	2" x 30'			Foam
	00212342	3" x 100			P.V.C.
	00203958	Can			Foam Aerosol
	RM060030	400"			Vinyl

Tools

Item	Part No.	Size 1	Size 2	Size 3	Description
Air Chuck (to be used with Adaptor) 	00859018	1/4" FPT	Ball Foot		
	00852504	1/4" MPT	1/4" MF		Adaptor
Brush, Nozzle 	00681901				Flowmatic
Carbonation Tester 	00251906				
Condenser Fin Comb 	00681904				
Crimper, Tab Clamp 	00681815				
Tubing Cutter 	00211237				Large 6" Cutter
	00681824				Small Butterfly Cutter

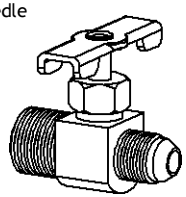
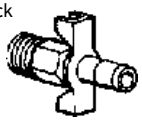
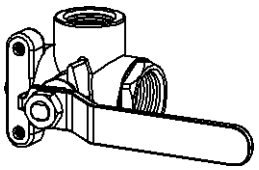
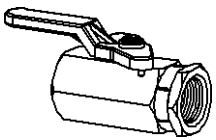
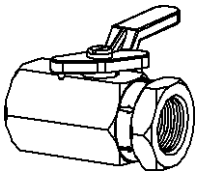
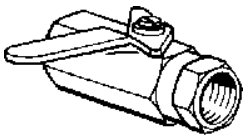
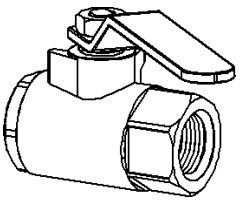
Tools (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Potenteometer	00681825				
Refractometer 	00251903				0-32
Thermometer 	00251905				Digital
Wrenches, Nozzle  	00206191	Dole		Soda	Plastic
	00681809	Flowmatic		Soda	Plastic
	00681823	Tap Rite		Beer	Stainless Steel

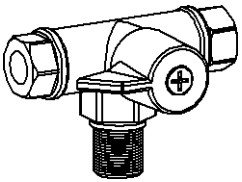
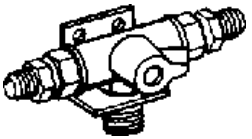
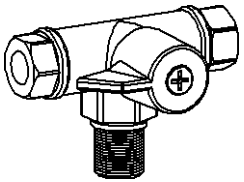
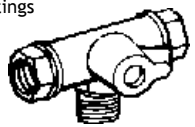
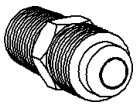
Tubing

Item	Part No.	Size 1	Size 2	Size 3	Description
Braided	Tubing	ID	OD	Clamp	Description
5/32"	RM151206	0.156	0.313	00855108	Nylon Braid
1/4"	RM157111	0.265	0.465	00855109	Nylon Braid
1/4"	RM152121	0.265	0.469	00855127	Red Braid
3/8"	RM152115	0.375	0.640	00855112	Red Braid
3/8"	RM157110	0.380	0.588	00855119	EVA Braid
1/2"	RM157113	0.515	0.815	00855133	EVA Braid
Nylon	Tubing	ID	OD	Clamp	Description
1/4"	RM151129	0.150	0.250	00856502 Nut	White Nylon
3/8"	RM151314	0.251	0.375	00204745 00204767	White Nylon
3/8"	RM151312	0.231	0.375	00856528 Nut	White Nylon
1/2"	RM151315	0.376	0.500	00204744 00204747	White Nylon
Polyethylene	Tubing	ID	OD	Clamp	Description
3/8"	PE500650	0.375	0.563	00855119	Poly
1/2"	PE051254	0.500	0.686	00855128	Poly
Rubber (Drain)	Tubing	ID	OD	Clamp	Description
5/8"	RM912111	0.625	0.875	00859112	Black
1"	RM912113	1.000	1.250	00859112	Black
Vinyl	Tubing	ID	OD	Clamp	Description
1/8"	00207002	0.125	0.219	00207003	Clear, Thick Wall
3/16"	RM151213	0.188	0.438	00855109	Clear, Thick Wall
3/16"	RM151222	0.313	0.438	00855127	Clear, Thin Wall
1/4"	RM151214	0.250	0.500	00855127	Clear, Thick Wall
5/16"	RM151215	0.313	0.563	00855119	Clear, Thick Wall
3/8"	RM151216	0.375	0.625	00855112	Clear, Thick Wall
1/2"	RM151224	0.500	0.750	00855133	Clear, Thick Wall

Valves

Item	Part No.	Size 1	Size 2	Size 3	Description
Needle 	00670023	1/8" MPT	1/4" MPT		Brass
	00670021	1/4" MPT	1/4" MF		Brass
	00670024	1/4" MF	1/4 SW		Stainless Steel (Elbow)
Petcock 	00670014	1/8" MPT			Brass
Three-Way Ball	00204743	1/4" FPT			Brass
	00205572	1/2" FPT			Brass
Shut-off Ball 	00204742	1/4" FPT	1/4" FPT	Ball Type	Brass
	00210723				Replacement Lever
	00204789	3/8" FPT	3/8" FPT	Ball Type	Brass
	00210725				Replacement Lever
	00670025	3/8" MF	1/8" MF		Brass
	00209558	1/2" FPT	1/2" FPT	Ball Type	Brass

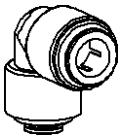
Valves (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Switch Over 	00670026	1/4" FPT			Aluminum
Assembly Less Fittings 	00671613	1/4" MF	1/4" MPT	1/4" MF	Brass
	00670010	1/4" INVFLX	1/4" MPT	1/4" INVFLX	Brass
Fittings 	00862201 (use on old valve)	1/4" INVFLX	1/4" MF		Brass
	00862203 (use on 00671613 and 00670010)	1/8" MPT	1/4" MF		Brass

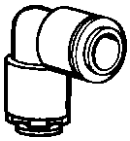
John Guest Fittings

Item	Part No.	Size 1	Size 2	Size 3	Description
Union Elbows (Elbow)	00111006	1/4" OD	1/4" OD		Tube
	00111007	5/16" OD	5/16" OD		Tube
	00209741	3/8" OD	3/8" OD		Tube

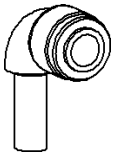
To be used when connecting thin wall poly tubing to thin wall poly tubing.

Reducing Elbow 	00111016	3/8" OD	1/4" OD		Tube
	00213885	3/8" OD	5/16" OD		Tube
	00214918	5/16" OD	1/2" OD		Tube

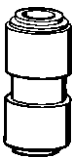
To be used when connecting thin wall poly tubing to thin wall poly tubing.

PlasticTubing to Stainless Steel Tubing 	00208800	3/8" OD	5/16"		Stainless Steel
	00208799	3/8" OD	3/8"		Stainless Steel

To be used when connecting thin wall poly tubing to Stainless Steeltubing.

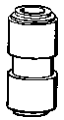
Plug in Elbow 	00214099	3/8" OD	3/8" OD Stem		
	00211678	1/2" OD	1/2 OD Stem		

To be used when connecting thin wall poly tubing to another John Guest Fitting.

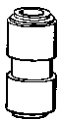
Union Connectors 	K0000681	1/4" OD	1/4" OD		
	00209190	3/8" OD	3/8" OD		
	00111022	3/16" OD	3/8" OD		
	00210126	1/2" OD	1/2 OD		

To be used when connecting thin wall poly tubing to thin wall poly tubing.

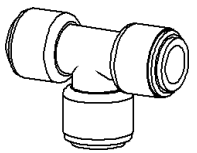
John Guest Fittings (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Reducing Union 	00111013	3/8" OD	5/16" OD		
	00209397	1/2" OD	3/8" OD		
	00210126	1/2" OD	1/2" OD		

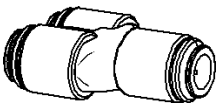
To be used when connecting thin wall poly tubing to thin wall polytubing.

PlasticUnion to Stainless SteelTubing 	00208796	3/8" OD	5/16" OD		Stainless Steel
	00209334	3/8" OD	3/8" OD		Stainless Steel

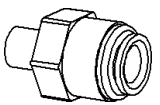
To be used when connecting thin wall poly tubing to Stainless Steeltubing.

Union Tee 	00111010	1/4" OD	1/4" OD	1/4" OD	
	00208791	3/8" OD	3/8" OD	3/8" OD	
	00210862	1/2" OD	1/2" OD	1/2" OD	

To be used when teeing thin wall poly tubing only.

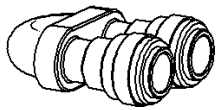
2-Way Divider 	00111008	3/8" OD	2 5/16" OD		
	00209346	3/8" OD	2 3/8" OD		

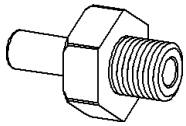
To be used when dividing thin wall poly tubing only.

Male Connector Adaptor 	00208801	1/8" MPT	5/32" OD		
	00111002	1/8" MPT	1/4" OD		
	00111009	1/8" MPT	5/16" OD		
	00209317	1/8" MPT	3/8" OD		
	00112023	5/16" MF	3/8" OD		
	00209328	1/4" MPT	3/8" OD		
	00209946	3/8" MF	3/8" OD		

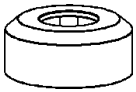
To be used when connecting thin wall poly tubing to a female pipe thread fitting.

John Guest Fittings (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
U-bends 	00216816	1/2" OD	1/2" OD		1" Centers

Stem Adaptor 	00111001	1/4" MPT	1/4" OD		
	00111003	1/8" MPT	1/4" OD		
	00111005	1/8" MPT	5/16" OD		
	00111011	1/4" MPT	1/4" OD		

To be used when connecting a John Guest Fitting to a female pipe thread fitting.

Collet Covers 	00208804	5/32" OD			
	00208803	3/8" OD			
	00209398	1/2" OD			

Used to hold collet and tube in place.

Collets	00210798	5/32" OD			Tube Retaining
	00210799	3/16" OD			Tube Retaining
	00210800	1/4" OD			Tube Retaining
	00210801	5/16" OD			Tube Retaining
	00210802	3/8" OD			Tube Retaining
	00210803	1/2" OD			Tube Retaining

Secures tube fitting.

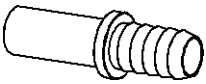
Tube Support	00210255	1/4" ID			Tube

Tubing stiffener used to prevent tubing deflection at fitting which would cause leak.

John Guest Fittings (continued)

Item	Part No.	Size 1	Size 2	Size 3	Description
Tubing Cartridge	00209416	5/16" OD			Tubing

Secures Stainless Steeltube to fitting.

Tube to Hose Stem Adapter 	00210750 Plastic	3/8" Barb	1/2" OD Stem		00217015 Stainless Steel
	00209947 Plastic	3/8" Barb	3/8" OD Stem		00112042 Stainless Steel
	00210749 Plastic	1/2" Barb	3/8" OD Stem		00217013 Stainless Steel
	00210752 Plastic	1/4" Barb	3/8" OD Stem		00112041 Stainless Steel
	00210638 Plastic	1/2" Barb	1/2" OD Stem		00217014 Stainless Steel

Used to connect a John Guest Fitting to thick wall poly tubing or braided tubing.

Plug	00209383	3/8" OD			Stem
	00111023	3/16" OD			Stem

Used to plug a John Guest Fitting.

Flow Bend Tube Clip	00209333	3/8" OD	1 1/4" R		Tube Flow Bend

Used to reinforce tubing and make sharp bend without crimping.

O-ring	00210792	5/32"			
	00210793	3/16"			
	00210794	1/4"			
	00210795	5/16"			
	00210796	3/8"			
	00210797	1/2"			

Correspond to John Guest Fitting size.

John Guest Fittings (continued)

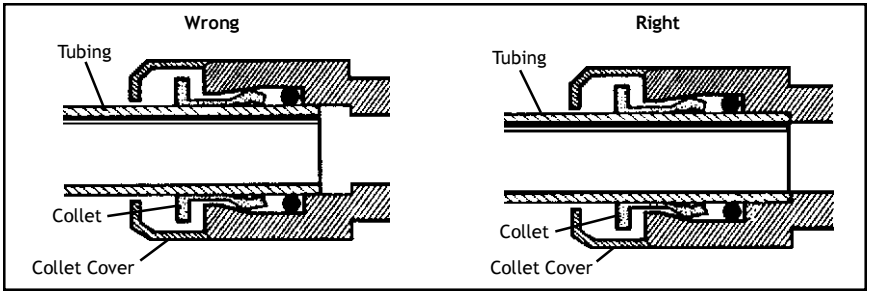
How to use john guest fittings

Before inserting tubing into John Guest Fitting, be sure end of tubing is cleanly cut at a 90° angle.

Right

Wrong

2. Insert tubing into John Guest Fitting. Push tubing firmly through fitting until it rests against a tube stop in the fittings main body housing. The tubing is now automatically locked into John Guest Fitting.
3. To release tubing from John guest Fitting, push in collet located on John Guest Fitting (if necessary, remove collet cover).



For stainless steel

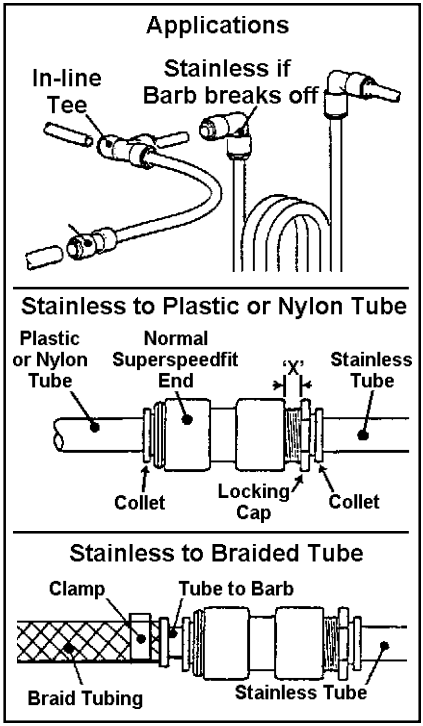
Metal tubing must be cut square and have a smooth burr-free end.

1. Turn the LOCKING CAP to show approximately 1/8" (3 mm) of thread at "X".
2. Push fitting onto the STAINLESS STEELensuring that it is fully up against the tube stop.
3. Tighten the LOCKING CAP half a turn. If the fitting is not secure, tighten a little further.
4. **Make sure fitting is secure.**
5. Push Plastictubing into other and of fitting insuring that it is fully up against the tube stop.

To release the fitting from the Stainless Steeltube, simply unscrew the LOCKING CAP three quarters of a turn, depressing the collet head as with a conventional John Guest Fitting.

Note: *If a fitting leaks as the SUPER SEAL end, simply tighten the LOCKING CAP until leaking stops.*

By doing this you increase the compression sealing of the O-rings on the steel tail.



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00218013 Revision B (GSW/KAZ) 05/03/99

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00218009 Revision D July 2002